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NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
CHESHIRE RESERVOIR DA. (U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV NOV 78

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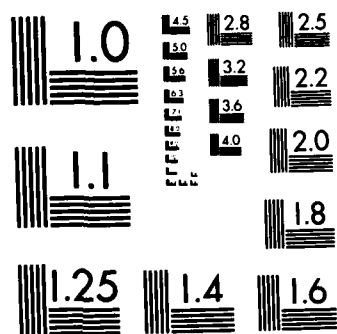
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AD-A154 484

HUDSON RIVER BASIN
CHESHIRE, MASSACHUSETTS

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CHESHIRE RESERVOIR DAM
MA 00211

PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Chershire Reservoir Dam is a stone masonry and concrete gravity dam about 50.5 feet long, and about 14 feet high with a dropped center spillway 40.5 feet long and a freeboard of 2.7 feet. Based on the Corps of Engineers guidelines, the dam seems to be in fair condition. Since the dam is classified as intermediate in size with a low hazard potential, the test flood, is 1/2 the Probable Maximum Flood.		



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF:

NEDED

JAN 30 1979

Honorable Edward J. King
Governor of the Commonwealth of
Massachusetts
State House
Boston, Massachusetts 02133

Dear Governor King:

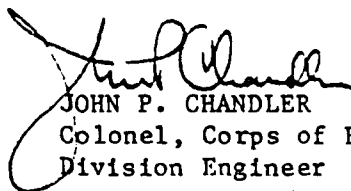
I am forwarding to you a copy of the Cheshire Reservoir Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts. In addition, a copy of the report has also been furnished the owner, Hoosac Reservoir Company, c/o Arnold Print Works, Inc., Columbia Street, Adams, Massachusetts 01220. ATTN: Mr. Richard Miller, Plant Engineer.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Quality Engineering for your cooperation in carrying out this program.

Sincerely yours,


JOHN P. CHANDLER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

**CHESHIRE RESERVOIR DAM
MA 00211**

**HUDSON RIVER BASIN
CHESHIRE, MASSACHUSETTS**

**PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM**

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NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

Identification No.	MA 00211
Name of Dam:	CHESHIRE RESERVOIR DAM
Town:	CHESHIRE
State:	COMMONWEALTH OF MASSACHUSETTS
Stream:	HOOSIC RIVER
Date of Inspection:	26 OCTOBER 1978

BRIEF ASSESSMENT

Cheshire Reservoir Dam is a stone masonry and concrete gravity dam about 50.5 feet long, about 14 feet high with a dropped center spillway 40.5 feet long and a freeboard of 2.7 feet.) The spillway is flanked upstream on the left by a low concrete and stone masonry wall which retains a railroad embankment and on the right by a concrete lined slope. The downstream training walls are stone masonry and concrete. Four 2-foot square sluiceways are equipped with manually controlled, damper type gates. Discharges over the spillway and through the sluiceways are into a channel which passes under Massachusetts Route No. 8 and then into the Hoosic River.

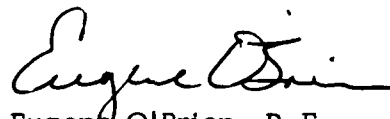
Phase I inspection and evaluation of Cheshire Reservoir Dam does not indicate conditions which would constitute an immediate hazard to human life or property. (Based on engineering judgment and the performance of the masonry and concrete dam and outlet works, the project appears to be in fair condition.) The project, however, does have inadequacies and deficiencies which, if not remedied, have the potential for developing into hazardous conditions.

Because there are no data on Probable Maximum Floods for an area of 15.2 square miles, it was necessary to synthesize a test flood hydrograph for the contributing area. (Since the dam is classified as intermediate in size, with a low hazard potential,) the test flood, in accordance with Corps of Engineers guidelines, is one half the Probable Maximum Flood (1/2 PMF). The 1/2 PMF inflow-peak was 28,592 cfs. The adequacy of the spillway was tested by routing the flood through the reservoir using a computer routing technique. The peak outflow from the 1/2 PMF was 11,242 cfs corresponding to El 976.5 or about 2.75 feet above the top of the dam.

Since the dam is expected to be overtopped with an inflow equal to 1/2 PMF, it is considered that the spillway is not adequate from a hydraulic and hydrologic standpoint. However, since the potential hazard as a result of a breach of the dam is low, and it is considered that little increase in hazard would result from an overtopping and failure, further investigations and/or recommendations are not considered necessary at this time.

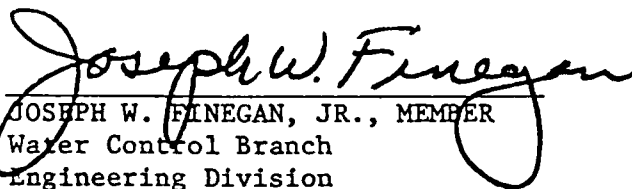
Remedial measures are recommended for implementation by the owner, within 12 to 24 months of receipt of this Phase I Inspection Report, to improve overall conditions. These measures, in general, are as follows:

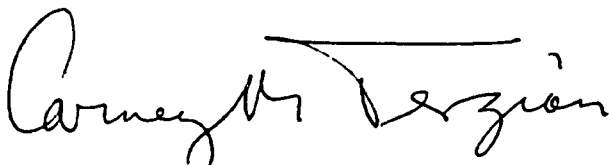
- Repairs to dam and appurtenant structures
- Programs for operation, maintenance and inspection

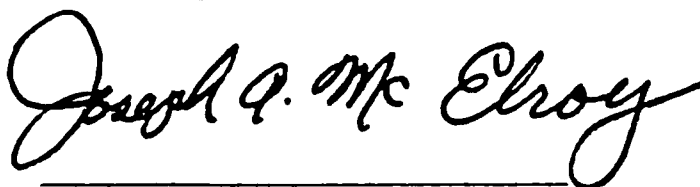


Eugene O'Brien, P.E.
New York No. 29823

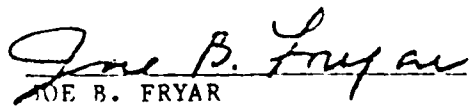
This Phase I Inspection Report on Cheshire Reservoir Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.


JOSEPH W. FINEGAN, JR., MEMBER
Water Control Branch
Engineering Division


CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division


JOSEPH A. MCELROY, CHAIRMAN
Chief, NED Materials Testing Lab.
Foundations & Materials Branch
Engineering Division

APPROVAL RECOMMENDED:


JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

HOOSIC RIVER BASIN
CHESHIRE RESERVOIR DAM
INVENTORY NO. MA 00211
PHASE I INSPECTION REPORT

CONTENTS

	<u>Page No.</u>
LETTER OF TRANSMITTAL	
BRIEF ASSESSMENT	
PREFACE	
OVERVIEW PHOTOGRAPH	i
VICINITY MAP	ii
TOPOGRAPHIC MAP	iii
1 PROJECT INFORMATION	1-1
1.1 GENERAL	1-1
a. Authority	1-1
b. Purpose	1-1
1.2 DESCRIPTION OF PROJECT	1-1
a. Description of Dam and Appurtenances	1-1
b. Location	1-2
c. Ownership	1-2
d. Purpose of Dam	1-2
e. Design and Construction History	1-2
f. Normal Operating Procedures	1-3
g. Size Classification	1-3
h. Hazard Classification	1-3
i. Operator	1-3
1.3 PERTINENT DATA	1-3
a. Drainage Area	1-3
b. Discharge at Damsite	1-4
c. Elevation	1-4
d. Reservoir	1-4
e. Storage	1-4
f. Reservoir Surface	1-4
g. Dam	1-5
h. Diversion and Regulating Tunnel	1-5

		<u>Page No.</u>
	i. Spillway	1-5
	j. Regulating Outlets	1-5
2	ENGINEERING DATA	2-1
2.1	DESIGN	2-1
2.2	CONSTRUCTION RECORDS	2-1
2.3	OPERATING RECORDS	2-1
2.4	EVALUATION OF DATA	2-1
	a. Availability	2-1
	b. Adequacy	2-1
	c. Validity	2-1
3	VISUAL INSPECTION	3-1
3.1	FINDINGS	3-1
	a. General	3-1
	b. Dam	3-1
	c. Appurtenant Structures	3-1
	d. Abutments	3-1
	e. Downstream Channel	3-1
	f. Reservoir Area	3-2
3.2	EVALUATION OF OBSERVATIONS	3-2
4	OPERATION AND MAINTENANCE PROCEDURES	4-1
4.1	PROCEDURES	4-1
4.2	MAINTENANCE OF DAM	4-1
4.3	MAINTENANCE OF OPERATING FACILITIES	4-1
4.4	WARNING SYSTEM IN EFFECT	4-1
4.5	EVALUATION	4-1
5	HYDRAULIC/HYDROLOGIC	5-1
5.1	EVALUATION OF FEATURES	5-1

		<u>Page No.</u>
a.	Design Data	5-1
b.	Experience Data	5-1
c.	Visual Inspection	5-1
d.	Overtopping Potential	5-2
5.2	EVALUATION OF THE ANALYSIS	5-3
6	STRUCTURAL STABILITY	6-1
6.1	EVALUATION OF STRUCTURAL STABILITY	6-1
a.	Visual Observations	6-1
b.	Design and Construction Data	6-1
c.	Operating Records	6-1
d.	Post-Construction Changes	6-1
e.	Seismic Stability	6-1
7	ASSESSMENT, RECOMMENDATIONS & REMEDIAL MEASURES	7-1
7.1	DAM ASSESSMENT	7-1
a.	Conditions	7-1
b.	Adequacy of Information	7-1
c.	Urgency	7-1
d.	Necessity for Additional Investigations	7-2
7.2	RECOMMENDATIONS	7-2
7.3	REMEDIAL MEASURES	7-2
a.	Alternatives	7-2
b.	Operating & Maintenance Procedures	7-2

APPENDICES

- A. VISUAL INSPECTION CHECKLIST
- B. DRAWINGS, PAST INSPECTION REPORTS AND OTHER DATA
 - Cheshire Reservoir Dam, Plan and Sections
 - Past Inspection Reports
 - Field Data
- C. PHOTOGRAPHS
- D. HYDROLOGIC DATA AND COMPUTATIONS
- E. INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS



1. GENERAL OVERVIEW OF DAM.

The Probable Maximum 6-Hour rainfall over ten square miles was obtained from Weather Bureau sources⁴ and reduced according to the Corps of Engineers recommendations.⁵ It was assumed that there would be a loss of 0.2 inches per hour, resulting in an excess rainfall of 16.56 inches in 6 hours and distributed in accordance with the data published by the World Meteorological Organization.⁶

The design storm was first applied to the 1.56 square mile drainage area of the Berkshire Pond and the resulting hydrograph routed through the pond using a computerized technique. The outflow from the Berkshire Pond was then added to the computed inflow hydrograph of the Cheshire Reservoir basin to form the one half Probable Maximum Flood, and resulted in a peak inflow of 28,592 cfs.

The computed discharge capacity of the Cheshire Reservoir Dam spillway with the water level at El 974.2 (the top of the training walls) is 583 cfs. In addition, the total computed discharge capacity of four sluiceways with water level at El 971.5 and El 974.2 is 178 cfs and 208 cfs, respectively. It is assumed that the remnant of the old bridge pier located at the downstream face of the spillway is not expected to affect the discharge capacity of the spillway. The available surcharge storage between the spillway crest El 971.5 and the top of the Dam El 974.2 is estimated to be 1858 acre-feet.

5.2 EVALUATION OF THE ANALYSIS

The Test Flood (1/2 PMF), routed through the reservoir using a computer technique, results in a rise of the reservoir level to a maximum El 976.95, with a corresponding outflow discharge of 11,242 cfs. The dam is overtopped by 2.75 feet and the spillway capacity is only 5.2% of the Test Flood outflow. The spillway is considered inadequate from a hydrologic and hydraulic viewpoint.

References

- ¹Report of Field Surveys Conducted by Soil Conservation Service, U.S. Department of Agriculture in Cooperation with Massachusetts Water Resources Commission. (See Appendix).
- ²Recommended Guidelines for Safety Inspection of Dams, Appendix D, U.S. Corps of Engineers.
- ³"Design of Small Dams," U.S. Department of Interior, Bureau of Reclamation, 1974.

condition of the channel floor. The natural channel is in good condition. It is reported that the operating mechanisms of the sluice gates are in good condition with the handles removed to prevent vandalism. At the time of inspection, it is reported that two sluice gates were open.

For further details see Section 3.1c.

d. Overtopping Potential

The potential for overtopping the dam was investigated on the basis of the adequacy of the spillway and the available surcharge storage to meet a potential emergency inflow. The dam, with a maximum storage capacity of 4000 acre-feet is classified as intermediate in size. In order to estimate the downstream hazard potential in the event of a dam failure, the U.S. Corps of Engineers' "Rule of Thumb" guidance was used. The estimate assumes: (a) the reservoir surface is at the top of the dam at the time of the breach, (b) a breach of 40% of the dam length (20.2 feet) occurs and (c) the channel has an average roughness coefficient (n) of 0.07. The estimated flood wave heights are as follows:

Distance Below Dam Feet	Peak Elevation Feet	Depth Feet	Discharge cfs
1400	963.2	3.2	1769
2500	960.2	3.2	1757
4000	962.0	8.0	1746

The relatively small flood wave is expected to cause very little damage. The visual inspection, corroborated by the information on USGS Quadrangle Map for Cheshire, Mass., indicates no development in the "flooded area" except the Church Street bridge, located about 4000 feet downstream of the dam could be damaged. The dam, therefore, is classified as a low hazard dam. Based on the size and hazard classification², one-half the Probable Maximum Flood was selected as the Test Flood.

For the analysis of the overtopping potential, it is assumed that (a) the entire reservoir acts as one unit, because the sub-basins are similar in size and physical features, and it is expected that the flood inflows would be simultaneous causing the level to rise as if there were no dividing dikes, (b) reservoir is at the spillway crest elevation at the start of the test flood, and (c) the four sluiceways are closed during the test flood. Two triangular unit hydrographs were developed.³ One to represent unit runoff from the Berkshire Pond sub-basin and the second, using weighted length of water-course and elevation difference, for the Cheshire Reservoir basin.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. Design Data

No design data or records of flood flows are available for the Cheshire Reservoir area. It was therefore necessary to synthesize a test flood for the contributing area of 9728 acres (15.2 square miles). The reservoir area at El 971.5 is 601 acres (0.94 square miles) or 6.2% of the basin. The reservoir is about 3.7 miles long with an average width of 0.25 miles and is divided into three storage areas by two roadway embankments. There are interconnecting culverts (5.0 feet diameter) beneath the roadways and the reservoir level is the same in these storage areas. The reservoir level is shown as El 970.0 on the USGS Quadrangle sheet for Cheshire, Mass., but the normal level equivalent to the spillway crest elevation is given as 971.5 (MSL).^{1*} The drainage basin is approximately 5 miles long by 3.5 miles wide and borders the reservoir on three sides. The weighted stream length and elevation difference of the basin is 2.1 miles and 1043 feet, respectively. This gives an average basin slope of 9.4% and is indicative of floods with large peaks and short times of concentration. The lake is 3/4 the length of the basin with simultaneous inflow from at least 8 brooks. This feature increases the probability of very high flood peak discharges of relatively short duration.

The basin is approximately 80% wooded with well established hardwood forests. The storage available in Berkshire Pond which is upstream of the Cheshire Reservoir controls flow from approximately 15% of the basin. The swamp in the Muddy Brook sub-basin also provides some storage. It is probable that the combined storages of about 30% of the basin would modify storm runoffs.

b. Experience Data

It is reported by persons interviewed that during the 1938 flood the water level in the reservoir reached the edge of the Massachusetts Route 8 roadway. During the March 1977 flood, the water was flowing slightly above the railroad track.

c. Visual Inspection

At the time of inspection, the pond level was at El 971.0, six inches below the spillway crest. The spillway is in fair condition. The upstream approaches and the downstream training walls are in good and fair condition respectively. The presence of water made it impossible to observe the

* See end of Section for References.

SECTION 4 - OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

There are no formal operation procedures for the project.

4.2 MAINTENANCE OF DAM

There is no formal maintenance manual for the project. Maintenance is carried out as needed. The dam is visited two or three times a week by personnel from Arnold Prints Works, who "look at" the dam, operate the sluice gates as required, and clear out any accumulated trash. There is also a state-wide program of inspection established several years ago by the Department of Environmental Quality Engineering, Division of Waterways. Copies of the Department's inspection reports, dated March 28, 1978, October 28, 1977 and December 11, 1972 are given in the Appendix. Prior to this, the County of Berkshire conducted the inspections, a copy of the County's report, dated September 17, 1968, is also included in the Appendix.

4.3 MAINTENANCE OF OPERATING FACILITIES

There is no established maintenance program for the operating facilities.

4.4 WARNING SYSTEM IN EFFECT

There is no warning system in effect.

4.5 EVALUATION

The maintenance and operating procedures for the dam and appurtenant structure are considered inadequate. Measures to improve these inadequacies are given in Section 7.

f. Reservoir Area

In the vicinity of the dam, there is no evidence of potentially unstable slopes or other unusual conditions which would adversely affect the dam.

3.2 EVALUATION OF OBSERVATIONS

Visual observations made during the course of the inspection revealed several deficiencies which at present do not adversely affect the adequacy of the dam. However, these deficiencies do require attention and should be corrected before further deterioration leads to a hazardous condition. Recommended measures to improve these conditions are given in Section 7.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General

The visual inspection of Cheshire Reservoir Dam was made on 26 October 1978. The weather was rainy with temperature about 60°F. The reservoir level at the time of inspection was at El 971.0, six inches below the spillway crest.

b. Dam

The sill and downstream face of the spillway are in fair condition. There is no evidence of distress or movement. Several leaks were observed on the downstream face. The water was spurting out from most of the leaks. (See Photograph No.2). A remnant of a 2.5 feet wide Massachusetts Route 8 old stone bridge pier is located in the center of and extending 10 feet downstream from, the face of the spillway. The headwalls of the spillway are in generally good condition. The presence of tailwater in the plunge pool made it impossible to observe the condition of the base of the dam or the existence of any underseepage.

c. Appurtenant Structures

The visible portion of the upstream left training wall and concrete lined approach slope is in generally good condition except at a few places on the wall the mortar is missing and the concrete is spalled. Both downstream training walls are in fair condition with spalled concrete and missing mortar at several places. The downstream left training wall is leaking at several locations.

The visible portion of the sluice gate operating stems are in good condition. It was reported that the gates are in operating condition, the operating handles are removed to prevent vandalism. The access foot bridge is in generally good condition.

d. Abutments

Except for the leakage noted on the downstream left training wall, no other seepage or unusual conditions were apparent at the abutments.

e. Downstream Channel

The downstream channel of the dam is in generally good condition, except where leakage is noted on the downstream left training wall. There is minor debris and few overhanging trees about 2000 feet downstream from the bridge crossing.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

There are no design data, drawings or specific memoranda available covering the construction of the original dam. A sketch of the dam section and plan, given in the Appendix was drawn from rough field measurements made at the time of the visual inspection. The elevations shown are approximate. Sketches showing a section of the dam are attached to field data obtained from U.S. Department of Agriculture, Soil Conservation, and included in the Appendix.

There is no information available on subsurface conditions.

2.2 CONSTRUCTION RECORDS

There are no construction records available.

2.3 OPERATING RECORDS

No records are kept by the owner of rainfall, pool elevation or gate operations.

2.4 EVALUATION OF DATA

a. Availability

Existing information was made available by Arnold Print Works, Inc. Adams, Mass.; Department of Public Works District No. 1, Commonwealth of Massachusetts, Pittsfield, Massachusetts; Department of Environmental Quality Engineering, Division of Waterways, Boston, Mass. and U. S. Department of Agriculture, Soil Conservation Service, Amherst, Mass.

b. Adequacy

The lack of in-depth engineering data did not allow for a definitive review. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection; past performance history and sound engineering judgment.

c. Validity

In general, the information obtained from above mentioned sketches and personal interviews is consistent with observations made during the inspection and therefore considered reliable.

g. Dam (See Spillway)

h. Diversion and Regulating Tunnel

Type	Not Applicable
Length	Not Applicable
Closure	Not Applicable
Access	Not Applicable
Regulating facilities	Not Applicable

i. Spillway

Type	Broad-crested
Length of weir, feet	40.5
Crest elevation, feet	971.5
Gates	None
U/S channel	None
D/S channel	See description in Sections 1.2 and 3.1

j. Regulating Outlets

The regulating outlets consist of an uncontrolled spillway and four sluiceways.

The stone masonry spillway is 40.5 feet in length, with a 2 feet wide flat stonesill, 2.7 feet below the top of dam.

The four sluiceways, each 2 feet square are reported to have inverts at El 960.5, 961.0, 961.5 and 962. Sluiceway discharges are through damper type gates which are manually controlled from the spillway crest. It is reported that the gates are operable.

b. Discharge at Damsite

Discharge from the Cheshire Reservoir is over a stone masonry, concrete spillway and through four sluiceways. The total computed sluiceways discharge capacities are 178 cfs and 208 cfs with the water level at El 971.5 (spillway crest) and El 974.2 (top of dam) respectively.

The stone masonry spillway is 40.5 feet wide and has a crest width of 2.0 feet. The computed maximum discharge with a head equivalent to the top of dam, El 974.2, is 583 cfs. The total discharge at El 974.2 is 791 cfs.

c. Elevation (ft. above MSL)

Top of dam	974.2
Maximum pool-design surcharge	Unknown
Maximum pool-test flood surcharge	976.95
Full flood control pool	Not Applicable
Recreation pool	971.5
Spillway crest (gated)	Not Applicable
Upstream portal invert diversion tunnel	Not Applicable
Downstream portal invert diversion tunnel	Not Applicable
Streambed at centerline of dam	960 (est)
Maximum tailwater	Unknown

d. Reservoir (feet)

Length of maximum pool	19,000
Length of recreation pool	18,480
Length of flood control pool	Not Applicable

e. Storage (acre-feet)

Recreation pool (gross)	2142
Flood control pool	Not Applicable
Design surcharge	Unknown
Test flood surcharge (net)	4054
Top of dam (gross)	4000

f. Reservoir Surface (acres)

Top of dam	754.5
Test flood pool	890
Flood control pool	Not Applicable
Recreation pool	621.0
Spillway crest	621.0

f. Normal Operating Procedures

There are no operating procedures. It is reported that the pond level is maintained at spillway crest except in winter, when it is kept at about one to two feet below the spillway crest. The sluice gates are operated as needed.

g. Size Classification

The dam is less than 40 feet high and has a maximum storage capacity of more than 1,000 acre-feet, but less than 50,000 acre-feet. It is, therefore, classified as an "intermediate" dam.

h. Hazard Classification

The dam is in the "low" hazard potential category because analysis indicates that a shallow depth flood wave would result from a dam failure. The wave would cause damage to the Church Street bridge. For details on selection of hazard potential category, see Section 5.1d.

i. Operator

The individual responsible for the day-to-day operation of the dam is:

Mr. Richard Miller, Plant Engineer
Arnold Prints Works, Inc.
Columbia Street
Adams, Mass. 01220
Telephone Number: (Home) 413-458-5837
(Office) 413-743-2600

1.3 PERTINENT DATA

a. Drainage Area

The drainage area contributing to the Cheshire Reservoir Dam is rectangular in shape, about 5 miles by 3.5 miles, with an area of 9728 acres (15.2 square miles). The reservoir is about 3.5 miles long by 0.25 miles wide, almost dividing the drainage area in two. The reservoir area is 6.2% of the total basin area. The reservoir is fed by numerous short brooks, entering at several different locations. The sub-basins of the brook are similar in physical features, with steep wooded slopes and little natural storage. These are expected to peak simultaneously during a basin-wide rain storm.

The dam is a stone masonry gravity structure about 50.5 feet long and at least 14 feet high; it has a 40.5 feet long ungated dropped center spillway with a 2 feet wide, flat stone sill 2.7 feet below top of dam. The downstream face has two steps. It is reported the regulating outlet system is composed of four 2-foot square sluiceways with intake inverts reported at El 960.5, 961.0, 961.5 and 962.0. Discharges through the sluiceways are manually controlled by damper type gates. The gate controls are located on the crest of the spillway with access provided by a 4-foot wide foot bridge which spans the spillway.

The dam is flanked upstream on the left by a railroad embankment and on the right by a concrete-paved natural slope. The railroad embankment in the vicinity of the dam is retained by a low, stone masonry wall. The downstream training walls are stone masonry and concrete. Extension of the wall form the concrete abutments of a bridge which carries Massachusetts Route 8 over the spillway channel. Downstream of the bridge the flow continues in the natural stream bed of the Hoosic River.

b. Location

The dam is located on the Hoosic River, about 0.4 miles south of the intersection between Massachusetts Route No. 8 and Lanesborough Road in the southern section of the Town of Cheshire.

c. Ownership

Cheshire Reservoir Dam is owned by Hoosac Reservoir Company. The day-to-day operation and maintenance is managed by Hoosac Reservoir Company with assistance from Arnold Print Works Inc.

d. Purpose of Dam

The impoundment provided by the dam is for recreational purposes.

e. Design and Construction History

Original design and construction records are not available. It is reported that the dam was built in approximately 1870. It is reported that repairs to the dam were done in 1968 and 1977. In 1968 the stone masonry joints were repointed, the sluice gates were repaired and a new foot bridge was installed.

In 1977 the upstream and downstream faces of the dam were sealed and mortared. The records of these repairs are on file at Arnold Print Works Inc.

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
HUDSON RIVER BASIN
INVENTORY NO. MA 00211
CHESHIRE RESERVOIR DAM
TOWN OF CHESHIRE
BERKSHIRE COUNTY, COMMONWEALTH OF MASSACHUSETTS

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Tippetts-Abbett-McCarthy-Stratton has been retained by the New England Division to inspect and report on selected dams in the State of Massachusetts. Authorization and notice to proceed was issued to Tippetts-Abbett-McCarthy-Stratton under a letter of May 3, 1978, from Mr. Ralph T. Garver, Colonel, Corps of Engineers. Contract No. DACW 33-78-C-0298 has been assigned by the Corps of Engineers for this work.

b. Purpose

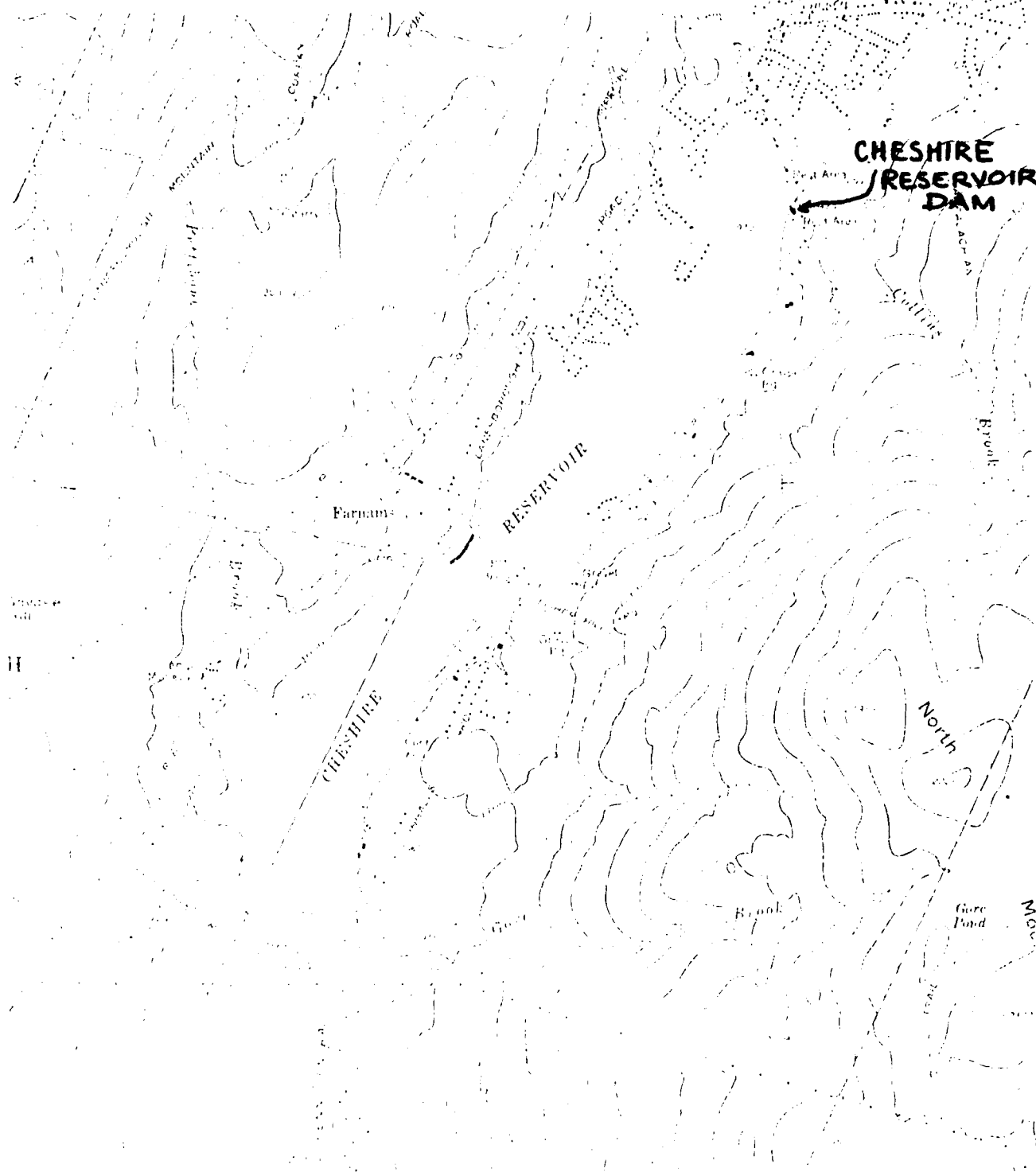
- (1) Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.
- (2) Encourage and prepare the States to initiate quickly effective dam safety programs for non-Federal dams.
- (3) To update, verify and complete the National Inventory of Dams.

1.2 DESCRIPTION OF THE PROJECT

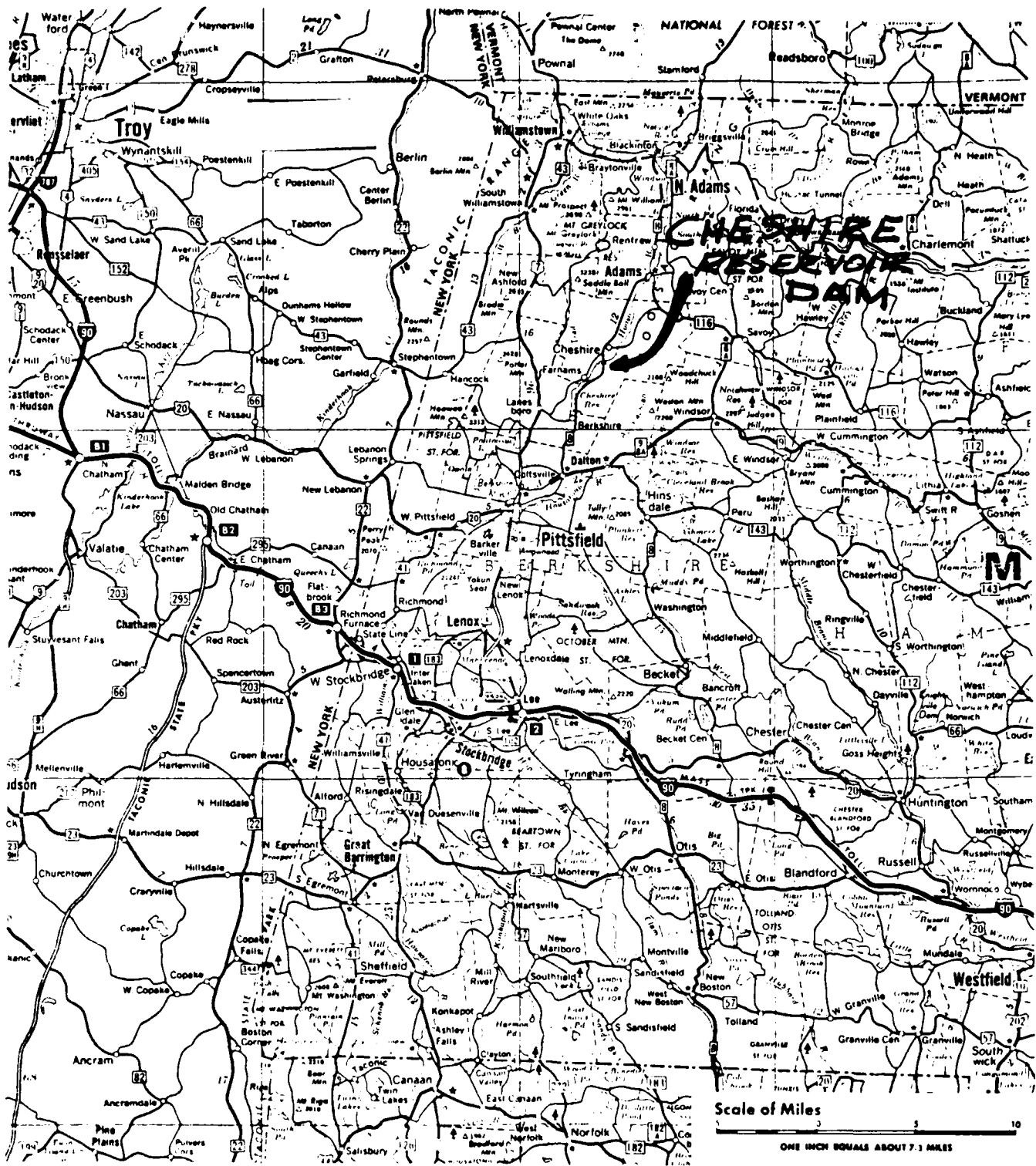
a. Description of Dam and Appurtenances

Cheshire Reservoir Dam is located on a pond adjacent to the Cheshire Reservoir. The pond and reservoir are separated by a railroad embankment with a connection provided by a 21 feet long railroad bridge.

CHESHIRE, MASS. QUADRANGLE
SCALE: 1 IN. = 2000 FT.



TOPOGRAPHIC MAP
CHESHIRE RESERVOIR DAM



VICINITY MAP
CHESHIRE RESERVOIR DAM

References (cont'd)

⁴Hydrometeorological Report No. 33, 1956.

⁵EC 1110-2-27, U.S. Corps of Engineers, August 1, 1966.

⁶"Manual For Estimation of Probable Maximum Precipitation," World Meteorological Organization, Operational Hydrology Report No. 1, 1973.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

Visual observations did not indicate any serious structural problems with the dam. The deficiencies described in Section 3 require attention; the measures to improve the deficiencies are given in Section 7.

b. Design and Construction Data

No design computations or other data pertaining to the structural stability of the dam have been located. On the basis of past performance, visual inspection, as well as engineering judgment, the dam at present appears to be structurally adequate.

c. Operating Records

There are no operating records or reports available. It is reported that there have been no operational problems which would affect the stability of the dam.

d. Post-Construction Changes

It is reported that the dam was built in approximately 1870. There are no records of any modification to dam. In 1968 and 1977 repairs were made to the dam and are described in Section 1.2b.

e. Seismic Stability

The dam is located in Seismic Zone No. 2 and in accordance with recommended Phase I guidelines does not warrant seismic analyses.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS & REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Conditions

Phase I investigation of Cheshire Reservoir Dam does not indicate conditions which would constitute an immediate hazard to human life or property. Based on engineering judgment and the performance of the dam and outlet works, the project appears to be in fair condition. The project, however, does have inadequacies and deficiencies which, if not remedied, have the potential for developing into hazardous conditions.

Because there are no data on Probable Maximum Floods for an area of 15.2 square miles, it was necessary to synthesize a test flood for the contributing area equal to one-half the Probable Maximum Flood (1/2 PMF). The 1/2 PMF inflow-peak was 28,592 cfs.

The adequacy of the spillway was tested by routing the Test Flood through the reservoir using computer routing technique. The water surface was assumed to be at the spillway crest at the start of the storm. The peak outflow from the routed flood (1/2 PMF) was 11,242 cfs corresponding to El 976.95 or 2.75 feet above the top of the dam. Since the dam is expected to be overtopped with an inflow equal to the 1/2 PMF, it is considered that the spillway is not adequate from a hydraulic and hydrologic standpoint. However, since the potential hazard as a result of a breach is low and it is considered that little increase in hazard would result from an overtopping and failure, further investigations and/or recommendations are not considered necessary at this time.

b. Adequacy of Information

The lack of in-depth engineering data did not allow for a definitive review. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, past performance history and sound engineering judgment.

c. Urgency

The remedial measures described in subsequent paragraphs should be undertaken by the owner within the next 12 to 24 months, after receipt of this Phase I Inspection Report.

d. Necessity for Additional Investigations

Additional investigations to assess the adequacy of the dam and appurtenant structures do not appear necessary.

7.2 RECOMMENDATIONS

None.

7.3 REMEDIAL MEASURES

a. Alternatives

None.

b. Operating & Maintenance Procedures

It is recommended that the following measures be undertaken by the owner within the next 24 months after receipt of this Phase I Inspection Report.

1. Establish a formal program of operation and maintenance, and initiate biennial inspection of the dam.
2. Provide round-the-clock surveillance during periods of unusually heavy precipitation.
3. Develop a formal system for warning downstream residents in case of emergency.
4. Repair leaks on the spillway and the downstream training walls.
5. Repair missing and spalled concrete and repoint all masonry walls.
6. The plunge pool floor at the base of the dam should be examined when the flow in the channel is at a minimum.

VISUAL INSPECTION CHECKLIST

APPENDIX A

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT CHESHIRE RESERVOIR DAM

DATE 10-26-78

TIME 9.30 AM

WEATHER Rainny - 60°F

W.S. ELEV. 971.0 U.S.

PARTY:

1. Harvey S. Feldman 6. _____

2. Jyotindra H. Patel 7. _____

3. _____ 8. _____

4. _____ 9. _____

5. _____ 10. _____

PROJECT FEATURE

INSPECTED BY

REMARKS

1. All project features inspected by party members.

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

PERIODIC INSPECTION CHECK LIST

PROJECT CHESHIRE RESERVOIR DAM DATE 10-26-78

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

DAM EMBANKMENT

*See spillway Weir, Approach and Discharge
Channel comments.*

Crest Elevation _____

Current Pool Elevation _____

Maximum Impoundment to Date _____

Surface Cracks _____

Pavement Condition _____

Movement or Settlement of Crest _____

Lateral Movement _____

Vertical Alignment _____

Horizontal Alignment _____

Condition at Abutment and at Concrete Structures _____

Indications of Movement of Structural Items on Slopes _____

Trespassing on Slopes _____

Sloughing or Erosion of Slopes or Abutments _____

Rock Slope Protection - Riprap Failures _____

Unusual Movement or Cracking at or near Toes _____

Unusual Embankment or Downstream Seepage _____

Piping or Boils _____

Foundation Drainage Features _____

Toe Drains _____

Instrumentation System _____

PERIODIC INSPECTION CHECK LIST

PROJECT CHESHIRE RESERVOIR DAM DATE 10-26-78

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

OUTLET WORKS - INTAKE CHANNEL AND Intake channel is a pond adjacent
INTAKE STRUCTURE To cheshire Reservoir.

a. Approach Channel

Slope Conditions Right concrete lined slope is in good condition;
left approach is railroad embankment retaining wall which
is also in good condition.

Bottom Conditions Unable to ascertain as pond
was full.

Rock Slides or Falls None

Log Boom None

Debris Minor debris

Condition of Concrete Lining See comments above

Drains or Weep Holes None

b. Intake Structure Swagway - becomes little dark in Valves. openings are submerged.

Condition of Concrete _____

Stop Logs and Slots _____

PERIODIC INSPECTION CHECK LIST

PROJECT CHESHIRE RESERVOIR DAM DATE 10-26-78

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

OUTLET WORKS - CONTROL TOWER

There is no control tower. The operating stems located on crest are not protected.

a. Concrete and Structural

General Condition _____

Condition of Joints _____

Spalling _____

Visible Reinforcing _____

Rusting or Staining of Concrete _____

Any Seepage or Efflorescence _____

Joint Alignment _____

Unusual Seepage or Leaks in Gate Chamber _____

Cracks _____

Rusting or Corrosion of Steel _____

b. Mechanical and Electrical

Air Vents _____

Float Wells _____

Crane Hoist _____

Elevator _____

Hydraulic System None

Service Gates Damper type gate valve which are
Reported in operating condition; and manually operated

Emergency Gates None

Lightning Protection System None

Emergency Power System None

Wiring and Lighting System None

PERIODIC INSPECTION CHECK LIST

PROJECT CHESHIRE RESERVOIR DAM DATE 10-26-78

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

OUTLET WORKS - OUTLET STRUCTURE AND

OUTLET CHANNEL

None. Outlet channel

General Condition of Concrete _____

is spillway channel, See Comments
Spillway Weir ... and Discharge
channel.

Rust or Staining _____

Spalling _____

Erosion or Cavitation _____

Visible Reinforcing _____

Any Seepage or Efflorescence _____

Condition at Joints _____

Drain Holes _____

Channel _____

Loose Rock or Trees Overhanging Channel _____

Condition of Discharge Channel _____

PERIODIC INSPECTION CHECK LIST

PROJECT CHESHIRE RESERVOIR DAM DATE 10-26-78

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS

a. Approach Channel *Approach channel is a pond adjacent to Cheshire Reservoir.*
General Condition Generally in good condition

Loose Rock Overhanging Channel None

Trees Overhanging Channel None

Floor of Approach Channel It was impossible to determine because pond was full.

b. Weir and Training Walls *Stone masonry*
General Condition of ~~Concrete~~ See Misc. Comments

Rust or Staining None

Spalling Both training walls spalled.

Any Visible Reinforcing None

Any Seepage or Efflorescence General leak in downstream of weir and downstream left training wall.

Drain Holes None

c. Discharge Channel

General Condition in good condition except leakage noted above

Loose Rock Overhanging Channel None

Trees Overhanging Channel Several downed trees from road nearby, there are few standing trees.

Floor of Channel Impossible to observe because of
water in the plunge pool.

Other Obstructions About 4 feet from weir the
channel passes under Rt. No. 8 bridge.

DEPARTMENT OF
ENVIRONMENTAL QUALITY ENGINEERING
DIVISION OF WATERWAYS

RECEIVED FEB 13 1976

HOOSAC RESERVOIR CO.

c/o Arnold Print Works, Inc.
Adams, MA 01220

Referred to Dam Section

Report back to _____

February 12, 1976

Mr. David Standley, Commissioner
The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Quality Engr.
Division of Waterways
100 Nashua Street
Boston, MA 02114

RE: Inspection - Dam #1-2-58-2
Cheshire
Cheshire Reservoir Dam

Dear Mr. Standley:

Relative to your letter of January 22 to Arnold Print Works concerning the above dam, please be advised that the owner of the reservoir and the dam is the above Hoosac Reservoir Co.

We note that on November 3, 1975, an engineer from the Massachusetts Department of Public Works made a visual inspection of the above dam and that there still exists the following items to be done that were noted in letter dated February 25, 1974. These conditions will receive the required attention after weather conditions are suitable for such work.

1. Cleaning and repointing some of the masonry joints of the side walls and center pier.
2. Investigating and making the necessary repair to correct water flowing beneath the spillway capstones on the southerly side of the center pier.

We appreciate your report and advice and agree that we do not want conditions to become more serious.

Very truly yours,

HOOSAC RESERVOIR CO.

E. John Reinke
Controller

EJR:mhg

L-168B

DAM NO. ± 1-2-58-2

- 3 -

12. Remarks & Recommendations; (Fully Explain)
PREVIOUS INSPECTION DATE: November 3, 1975

The dam has had considerable repair work done on it during the summer.

The water was drawdown and the entire dam was sealed and mortared. (see
photos)

No deficiencies were noted at this inspection.

For location see Topo Sheet 4-C.

13. Overall Condition:

- X 1. Safe _____
 2. Minor repairs needed _____
 3. Conditionally safe - major repairs needed _____
 4. Unsafe _____
 5. Reservoir impoundment no longer exists (explain)

Recommend removal from inspection list _____

L-168-A

DAM NO. 1-2-58-2

8. Downstream Face of Dam:

Condition: 1. Good X 2. Minor Repairs _____

3. Major Repairs _____ 4. Urgent Repairs _____

9. Emergency Spillway

Condition: 1. Good _____ 2. Minor Repairs _____

3. Major Repairs _____ 4. Urgent Repairs _____

Comments: _____

10. Water level at time of inspection 0.3' above X below _____

top of dam _____

principal spillway X _____

other _____

11. Summary of Deficiencies Noted:

NONE Growth (Trees & Brush) on Embankment _____

" Animal Burrows and Washouts _____

" Damage to slopes or top of dam _____

" Cracked or damaged masonry _____

" Evidence of seepage _____

" Evidence of piping _____

" Erosion _____

" Leaks _____

" Trash and/or debris impeding flow _____

" Clogged or blocked spillway _____

" Other _____

INSPECTION REPORT - DAMS AND RESERVOIRS

1. Location: City/Town CHESHIRE Dam No. 1-2-58-2
 Name of Dam Cheshire Reservoir Inspected by RDJordan-RSpaniol
 Date of Inspection October 28, 1977
 Previous Inspection November 3, 1975

2. Owner/s per: Assessors _____
 Reg. of Deeds _____ Personal Contact _____

1. Arnold Print Works Adams, MA
 Name _____ St. & No. _____ City/Town/State _____ Tel. No. _____

2. _____
 Name _____ St. & No. _____ City/Town/State _____ Tel. No. _____

3. Caretaker (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

_____ Name _____ St. & No. _____ City/Town/State _____ Tel. No. _____

4. No. of Pictures taken 1

5. Degree of Hazard: (If dam should fail completely)*

1. Minor _____ 2. Moderate X

3. Severe _____ 4. Disastrous _____

*This rating may change as land use changes (future development)

6. Outlet Control: Automatic _____ Manual X

Operative X Yes _____ No _____

Comments: _____

7. Upstream Face of Dam:

Condition: 1. Good X 2. Minor Repairs _____

3. Major Repairs _____ 4. Urgent Repairs _____

Comments: _____

12. Remarks & Recommendations; (Fully Explain)

PREVIOUS INSPECTION DATE:

Supplementary Report: March 28, 1978

MARCH 28, 1978: On this date I was requested to inspect the dam by Deputy Chief Engineer Hannon.

Several people were present during the inspection including: Mr. Grizzi, Representing the Civil Defense Agency Area 4, Trooper Geo. Mott, Mass. State Police, Two Maintenance Men from Arnold Print Works, and the Cheshire Civil Defense Director.

Several leaks were visible through the face of the dam and at both abutments. Most of the leaks appear to be under pressure as the water was spurting out from the structure. Water level was approximately three inches above the spillway.

In my opinion, there was no immediate danger of failure, however, as a precautionary measure, I recommended lowering the impoundment. The gates were partially opened by the men from Arnold Print Works.

March 29, 1978: Checked water level at the dam. It was approximately 2" below the spillway crest. No pressure reduction of the leaks was noted. I therefore recommended that the lowering of the reservoir continue.

The owners repaired the upstream face of this structure in the summer of 1977. At the District inspection conducted in October 1977 no pressure leaks were noted.

Although this dam has a low head there is a large impoundment and a sudden failure could cause damage downstream. Due to the number and type of leaks observed, the District recommends that the owners be advised to retain a consultant to conduct an in depth analysis of the structure.

This office will continue to monitor the dam on a daily basis.

13. Overall Condition:

- _____ 1. Safe _____
- _____ 2. Minor repairs needed _____
- _____ 3. Conditionally safe - major repairs needed _____
- _____ 4. Unsafe _____
- _____ 5. Reservoir impoundment no longer exists (explain)

Recommend removal from inspection list _____



The Commonwealth of Massachusetts

Executive Office of Transportation and Construction

Department of Public Works

DISTRICT #1 OFFICE
VETERAN'S MEMORIAL HIGHWAY, LENOX
P.O. BOX 1151, PITTSFIELD 01201

DEPARTMENT OF
ENVIRONMENTAL QUALITY ENGINEERING
DIVISION OF WATERWAYS

March 30, 1978

RECEIVED APR 3 1978

Referred To J.I.
Report back to _____
File _____

SUBJECT WATERWAYS-District One
Cheshire Reservoir Dam
Dam #1-2-58-2

ATTENTION Mr. J. J. Hannon

Mr. David Standley, Commissioner

Department of Environmental Quality Engineering

Dear Sir

We have enclosed a copy of a supplementary inspection report
for the subject project.

Very truly yours

Dean P. Amidon, P. E.
District Highway Engineer

RDJdic
Enclosure
cc SurLen

DEPARTMENT OF
ENVIRONMENTAL QUALITY ENGINEERING
DIVISION OF WATERWAYS

HOOSAC RESERVOIR CO.

c/o Arnold Print Works, Inc.
Adams, MA 01220

RECEIVED APR 18 1978

Referred To J. I.
Report back to _____
File _____

April 11, 1978

RE: Dam No. 1-2-58-2
Cheshire Reservoir

Mr. John J. Hannon, P.E.
Chief Engineer
The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Quality Engineering
Division of Waterways
100 Nashua Street
Boston, Massachusetts 02114

Dear Mr. Hannon:

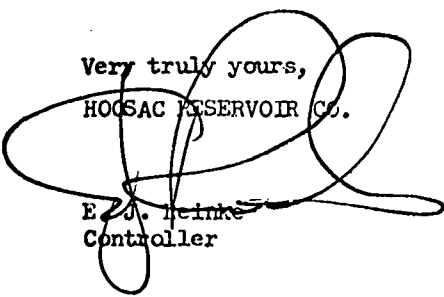
We have your letter of April 3 addressed to Arnold Print Works, Inc. regarding the above matter. Please be advised that the owner of the reservoir and the dam is the Hoosac Reservoir Co.

Also, relative to your recommendation, we are contacting Robert G. Brown & Associates, Inc., of Pittsfield, regarding a study of the conditions of the dam.

I presume that your department is aware that in early August of 1977, the dam underwent extensive repairs, and at that time at our request, Inspector Bob Jordan, of your division, looked at it.

We appreciate your interest and notice and ^{will} keep you advised of progress.

Very truly yours,
HOOSAC RESERVOIR CO.


E. J. Heinke
Controller

EJR:mhg

L-168B

DAM NO. ± 1-2-58-2

- 3 -

12. Remarks & Recommendations; (Fully Explain) .
PREVIOUS INSPECTION DATE: November 3, 1975

The dam has had considerable repair work done on it during the summer.

The water was drawdown and the entire dam was sealed and mortared. (see
photos)

No deficiencies were noted at this inspection.

For location see Topo Sheet 4-C.

13. Overall Condition:

- ☒ 1. Safe _____
☐ 2. Minor repairs needed _____
☐ 3. Conditionally safe - major repairs needed _____
☐ 4. Unsafe _____
☐ 5. Reservoir impoundment no longer exists (explain)
Recommend removal from inspection list _____

L-168-A

DAM NO. 1-2-58-2

8. Downstream Face of Dam:

Condition: 1. Good X 2. Minor Repairs _____
3. Major Repairs _____ 4. Urgent Repairs _____

9. Emergency Spillway

Condition: 1. Good _____ 2. Minor Repairs _____
3. Major Repairs _____ 4. Urgent Repairs _____

Comments: _____

10. Water level at time of inspection 0.3' above X below _____
top of dam _____
principal spillway X _____
other _____

11. Summary of Deficiencies Noted:

NONE Growth (Trees & Brush) on Embankment _____
" Animal Burrows and Washouts _____
" Damage to slopes or top of dam _____
" Cracked or damaged masonry _____
" Evidence of seepage _____
" Evidence of piping _____
" Erosion _____
" Leaks _____
" Trash and/or debris impeding flow _____
" Clogged or blocked spillway _____
" Other _____

INSPECTION REPORT -- DAMS AND RESERVOIRS

1. Location: ~~City~~/Town CHESHIRE Dam No. 1-2-58-2Name of Dam Cheshire Reservoir Inspected by RJJordan-RSpaniolDate of Inspection October 28, 1977Previous Inspection November 3, 19752. Owner/s per: Assessors _____
Reg. of Deeds _____ Personal Contact _____1. Arnold Print Works , Adams, MA
Name _____ St. & No. _____ City/Town/State _____ Tel. No. _____2. _____
Name _____ St. & No. _____ City/Town/State _____ Tel. No. _____

3. Caretaker (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Name _____ St. & No. _____ City/Town/State _____ Tel. No. _____

4. No. of Pictures taken 1

5. Degree of Hazard: (If dam should fail completely)*

1. Minor _____ 2. Moderate X _____

3. Severe _____ 4. Disastrous _____

*This rating may change as land use changes (future development)

6. Outlet Control: Automatic _____ Manual X _____Operative X _____ Yes _____ No _____Comments: _____

7. Upstream Face of Dam:

Condition: 1. Good X _____ 2. Minor Repairs _____

3. Major Repairs _____ 4. Urgent Repairs _____

Comments: _____



The Commonwealth of Massachusetts

Executive Office of Transportation and Construction

Department of Public Works

DISTRICT #1 OFFICE
VETERAN'S MEMORIAL HIGHWAY, LENOX
P. O. BOX 1151, PITTSFIELD 01201

September 22, 1978

SUBJECT WATERWAYS - District One
Onota Lake Dam 1-2-236-6
Cheshire Reservoir Dam 1-2-58-2

Mr. Harvey Feldman
Tibbit, Abbott, McCarthy, Stratton
345 Park Avenue
New York City 10022

Dear Sir

We have enclosed a copy of the latest District One Inspection Report for the subject dams.

Although the report for Cheshire Reservoir shows the structure to be in satisfactory condition, a problem developed in March 1978 and at the request of the Civil Defense Agency this office conducted a visual inspection on March 27, 1978. Several pressure leaks were noted in the face of the dam and the left abutment. We recommended the immediate lowering of the pond and advised the owners to retain the services of an engineering consultant to conduct an indepth investigation. The firm of Robert G. Brown & Associates was awarded a contract to perform this work.

Mr. Brown has not completed his study, but he has a considerable amount of information relative to the structure.

Mr. Brown can be reached at the following address should you desire to contact him: Robert G. Brown & Associates, Berkshire Common, South Street, Pittsfield, MA 01201, telephone: (413) 499-1560.

If we can be of any further assistance, please contact this office.

Very truly yours

Dean P. Amidon, P. E.
District Highway Engineer

RDJdic
Enclosures
cc SurLen

DRAWINGS, INSPECTION REPORTS
AND OTHER DATA

APPENDIX B

PERIODIC INSPECTION CHECK LIST

PROJECT CHESHIRE RESERVOIR DAM DATE 10-26-78

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

OUTLET WORKS - SERVICE BRIDGE is 4 feet wide, steel grating and spans over the spillway

a. Superstructure

Bearings None

Anchor Bolts Anchor to the headwall of spillway.

Bridge Seat None

Longitudinal Members Steel channel and in good condition

Under Side of Deck is bottom of steel grating and in good condition

Secondary Bracing steel channel and in good condition

Deck is of steel grating and in good condition

Drainage System None

Railings steel railings both sides and in good condition

Expansion Joints None observed

Paint _____

b. Abutment and Piers

General Condition of Stone-masonry Concrete good

Alignment of Abutment Good

Approach to Bridge on right is from 44.3 and on left is from concrete embankment

Condition of Seat and Backwall _____

COUNTY OF BERKSHIRE, MASS.

INSPECTION OF DAMS

1-2-58-2

City or Town of Cheshire Date September 17, 1968

Name of Dam Cheshire Reservoir Inspector William A. Heaphy

Owner Arnold Print Works Inc. Address Lime St. Adams, Mass. Tel. _____

Caretaker Carl Northrup Address Melrose St. Adams, Mass. Tel. _____

Location Northeast Corner of Lake 20' East of R.R. Tracks.

Type and Dimensions Stone Masonry 50' Long 15' high

Spillway, type and size Stone- 40' long 2'9" Freeboard

Outlets, type and size Round 3'X3' outlets (Stone Masonry) With Butterfly Valves, 30" high X 25" wide

Flashboards, type and height None

Date Built 1870 Condition Fair

When last repaired 1968 By whose orders Owner

Nature of Repairs Pointing up Spillway to seal leaks, Repairs made to gates, New Footbridge built.

Purpose of Dam Industrial use

Approximate storage of water 67,000,000 cubic feet

Approximate area of water shed 15 square miles

Possible damage due to failure of dam Damage to bridge, State highway and Railroad

Remarks Water Level about 18" below spillway . Many leaks under stone slabs for full width of Spillway, about 6 being fairly large. Foot bridge deteriorating.

Recommendations That repairs be undertaken at once and completed before fall

DESCRIPTION OF DAM

DISTRICT ONESubmitted by R D JordanDam No. 1-2-58-2Date 12-11-72City/Town CheshireName of Dam Cheshire Reservoir

1. Location: Topo Sheet No. 4-C

Provide 8-1/2" x 11" in clear copy of topo map with location of Dam clearly indicated.

2. Year built: 1870 Year/s of subsequent repairs _____

3. Purpose of Dam: Water Supply _____ Recreational X _____
Irrigation _____ Other _____

4. Drainage Area: 15 sq. mi. _____ acres.

5. Normal Ponding Area: 600 Acres; Ave. Depth _____
Impoundment: _____ gals; _____ acre ft.

6. No. and type of dwellings located adjacent to pond or reservoir _____
i.e. summer homes etc. _____

7. Dimensions of Dam: Length 40' Max. Height 14'
Slopes: Upstream Face vert
Downstream Face vert
Width across top 7'

8. Classification of Dam by Material:
Earth _____ Conc. Masonry _____ Stone Masonry X _____
Timber _____ Rockfill _____ Other _____

9. A. Description of present land usage downstream of dam: _____
50 % rural; 50 % urban.
B. Is there a storage area or flood plain downstream of dam which could accommodate the impoundment in the event of a complete dam failure
Yes partial No _____

f.

L-169 A

DAM NO. 1-2-58-2

10.

Risk to life and property in event of complete failure.

No. of people 150+

No. of homes 40+

No. of Businesses _____

No. of Industries _____

No. of Utilities _____

Railroads Penn Central

Other dams _____

Other _____

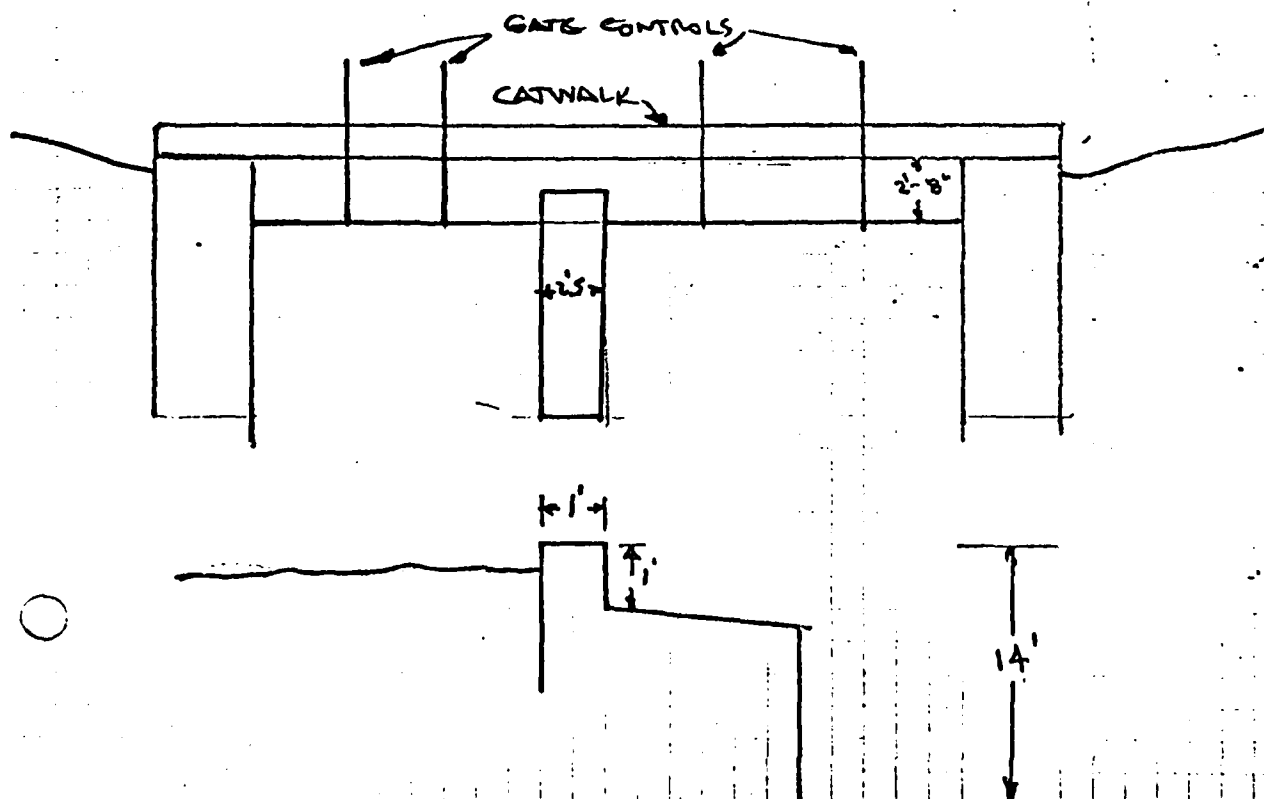
Type _____

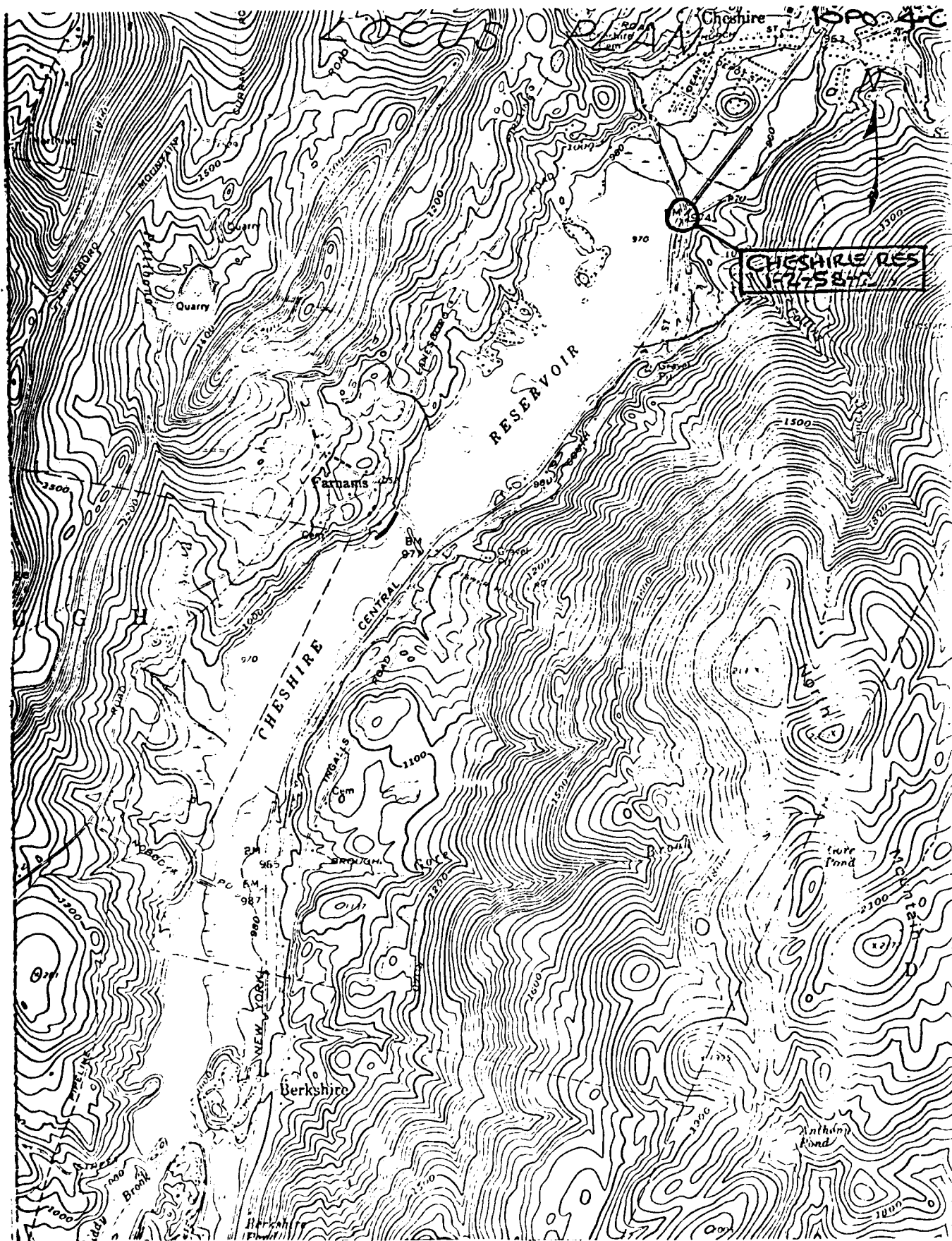
Type _____

11.

Attach Sketch of dam to this form showing section and plan on 8-1/2" x 11" sheet.

Hand-drawn plan view of a bridge structure. The bridge is 40' long and 10' wide. It has a central rectangular opening measuring 10' by 10'. The bridge is supported by two abutments, each 5' wide. The left abutment is 6' high, and the right abutment is 24' high. The bridge is labeled "BRIDGE" and "RFB".





U. S. DEPT. OF AGRICULTURE
SOIL CONSERVATION SERVICE

June 19, 1974
Hudson W/S
Field Trip
3/4/74 - 3/5/74

FIELD DATA

- 1 -

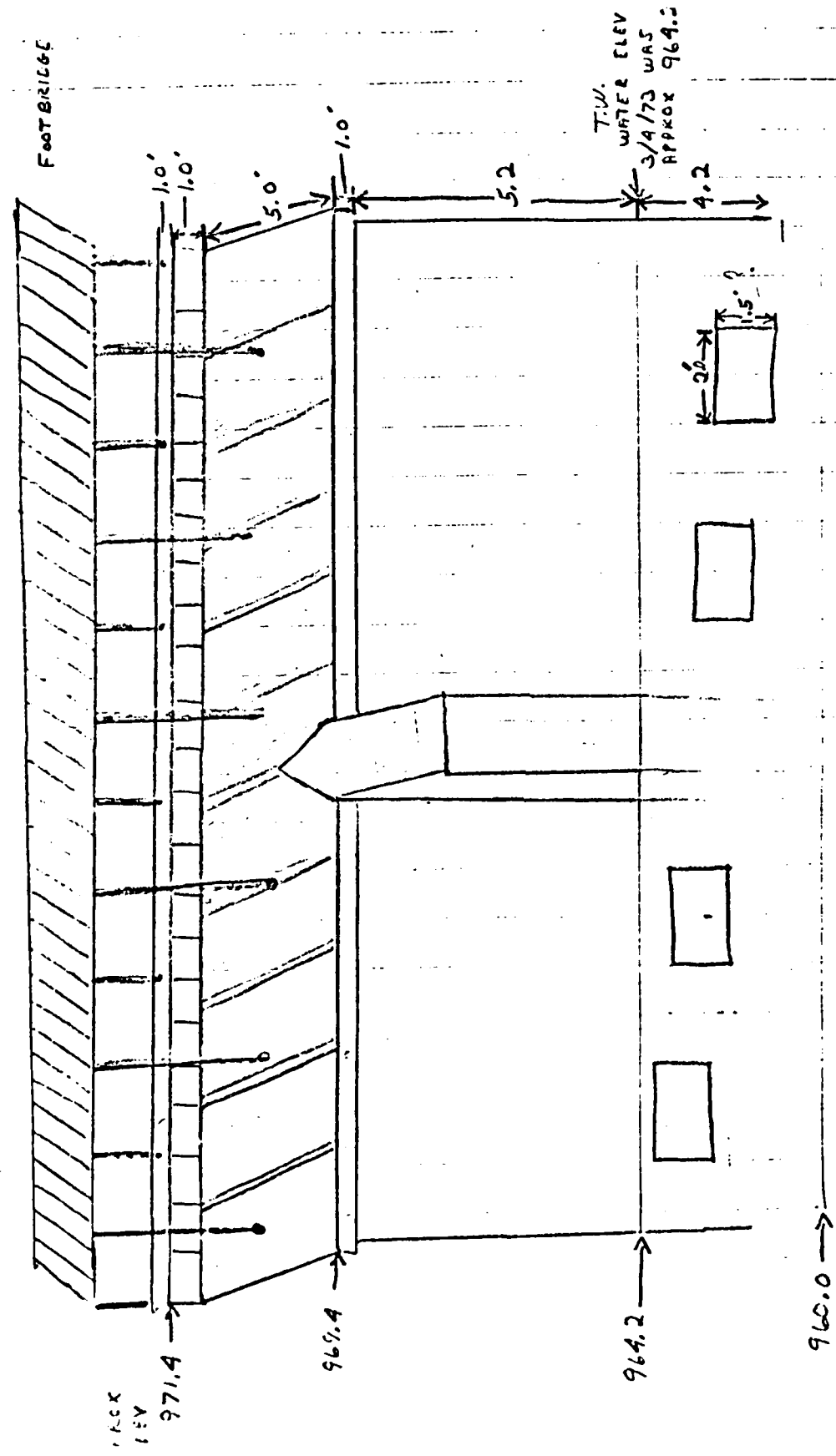
① CHESHIRE RESERVOIR OUTLET SPILLWAY

The reservoir and spillway are owned and controlled by the Hoosic River Realty Co., a subsidiary of Arnold Print Works Inc. in Adams. The Plant engineer did not have a drawing of the dam but thought one could be obtained through the State.

I spoke to the Cheshire Town Engineer concerning flooding at the reservoir. He referred me to Mr. LaBoe who owns the package store across the street from the spillway. At one time he was the keeper of the dam and supplied me with info concerning it. There are four 2' box culverts on the bottom of the face of the dam. These are staggered at different elevations. - Looking closely they can be seen below the water line. See attached drawing

* GAGE READING AT RESERVOIR - 970.75

FRONT VIEW - Looking U/S AT FACE OF SHILLWAY ON CHESHIRE RESERVOIR



* CULVERTS ARE STAGGERED @ APPROX 6" ELEV. INTERVAL

* COULD NOT SEE OPENING ON BACK SIDE OF DAM BUT 1 LB BOE THINKS ARE ALL AT SAME ELEV, ALL OPEN TO BOTTOM (LARRY SHOULD HAVE INVERT ELEV) AND ARE 3' WIDE AND 1.5' HIGH

② THERE ARE NO OPENINGS, OTHER THAN THE ONE
LARRY L. HAS DATA FOR, UNDER R.R. AT RESERVOIR.

③ GAGE READING - 970.75

④ ROAD CROSSING BETWEEN THE TWO MAJOR
RESERVOIR STORAGE AREAS

STORAGE AREA I
U/S (use hand level
and red.)

CULVERT A
11" STORAGE AREA II
D/S

(looking U/S)

CROSS SECTION ROAD ELEV @ 5.0' CULVERT
IS 977.15

ROAD ELEV
APPROX 680

ROAD ELEV
AT 2.0' CULVERT
IS 976.95

230' Rel. Low Point 976.5

320'

ROAD

6.2

6.4

2.9

CULVERT A

2.0' CMP

INVERT
ELEV 967.85

CULVERT B

5.0' RCLMP
3.0' RCLMP
3.0' RCLMP

3.2

3.2

INVERT
ELEV 967.55

WATER
LEVEL
970.75

2.0' CMP IS IN
VERY POOR CONDITION

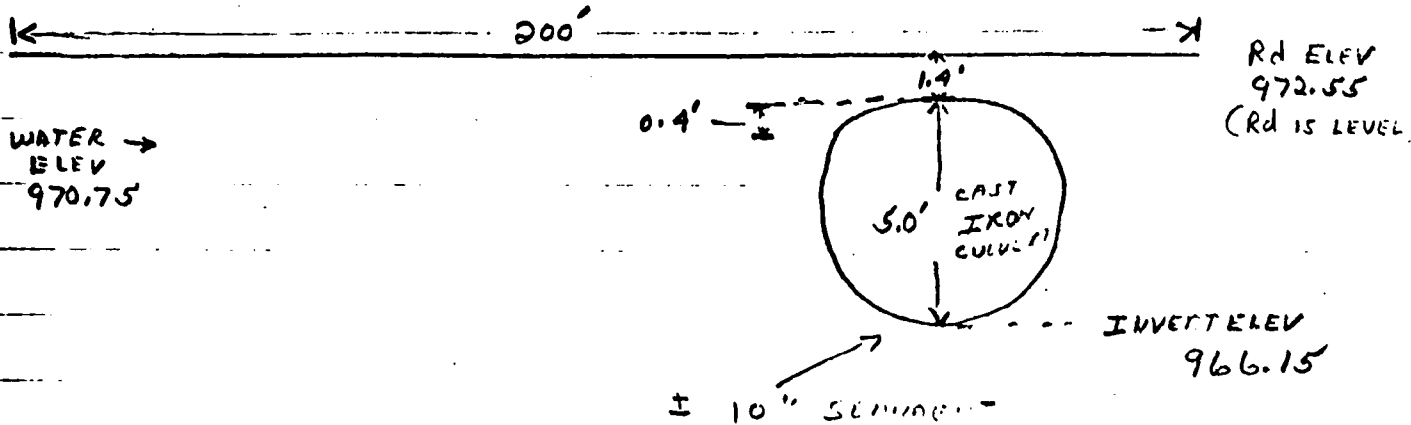
± 6" SLOPE

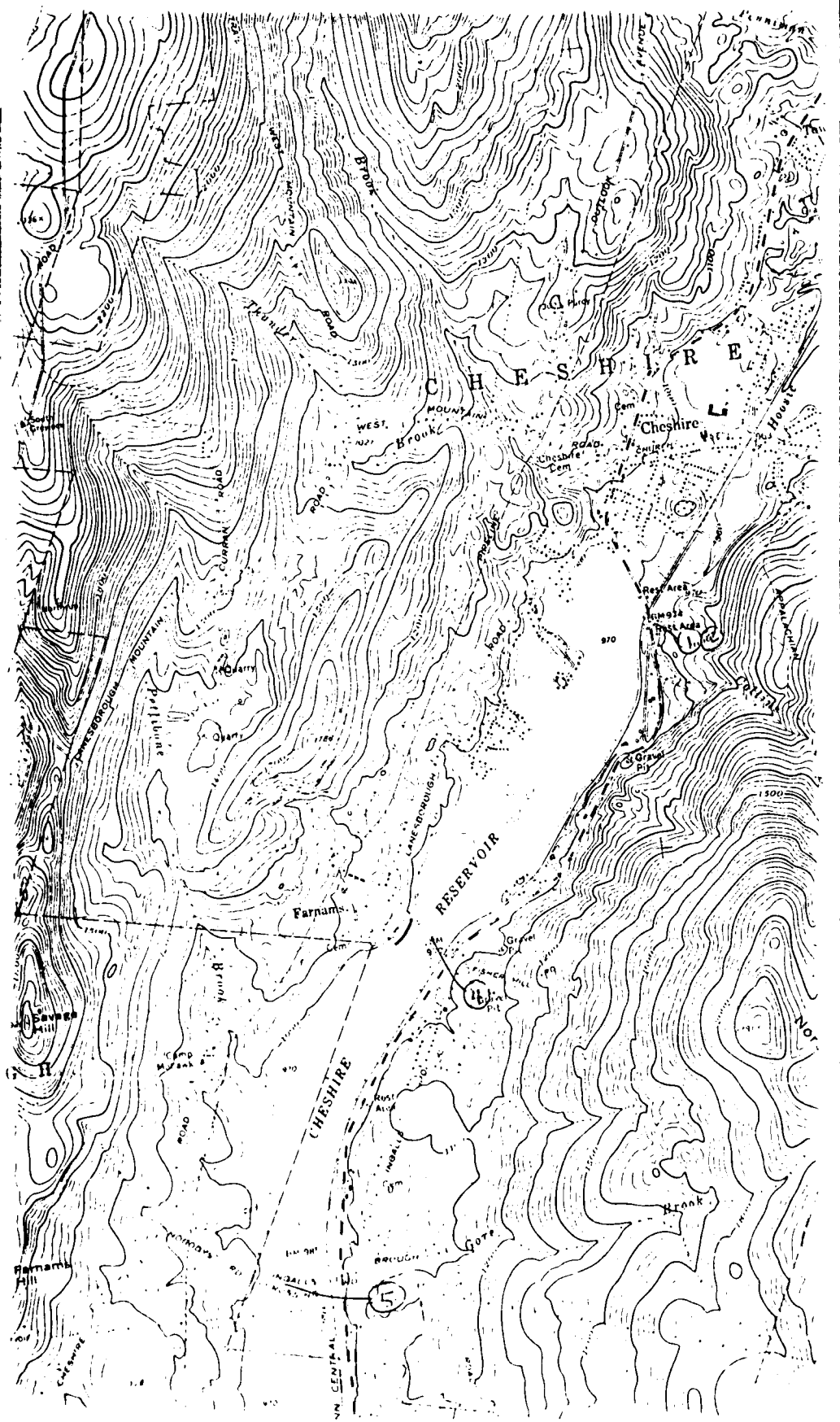
(ROAD AT 7.5' ELEV)

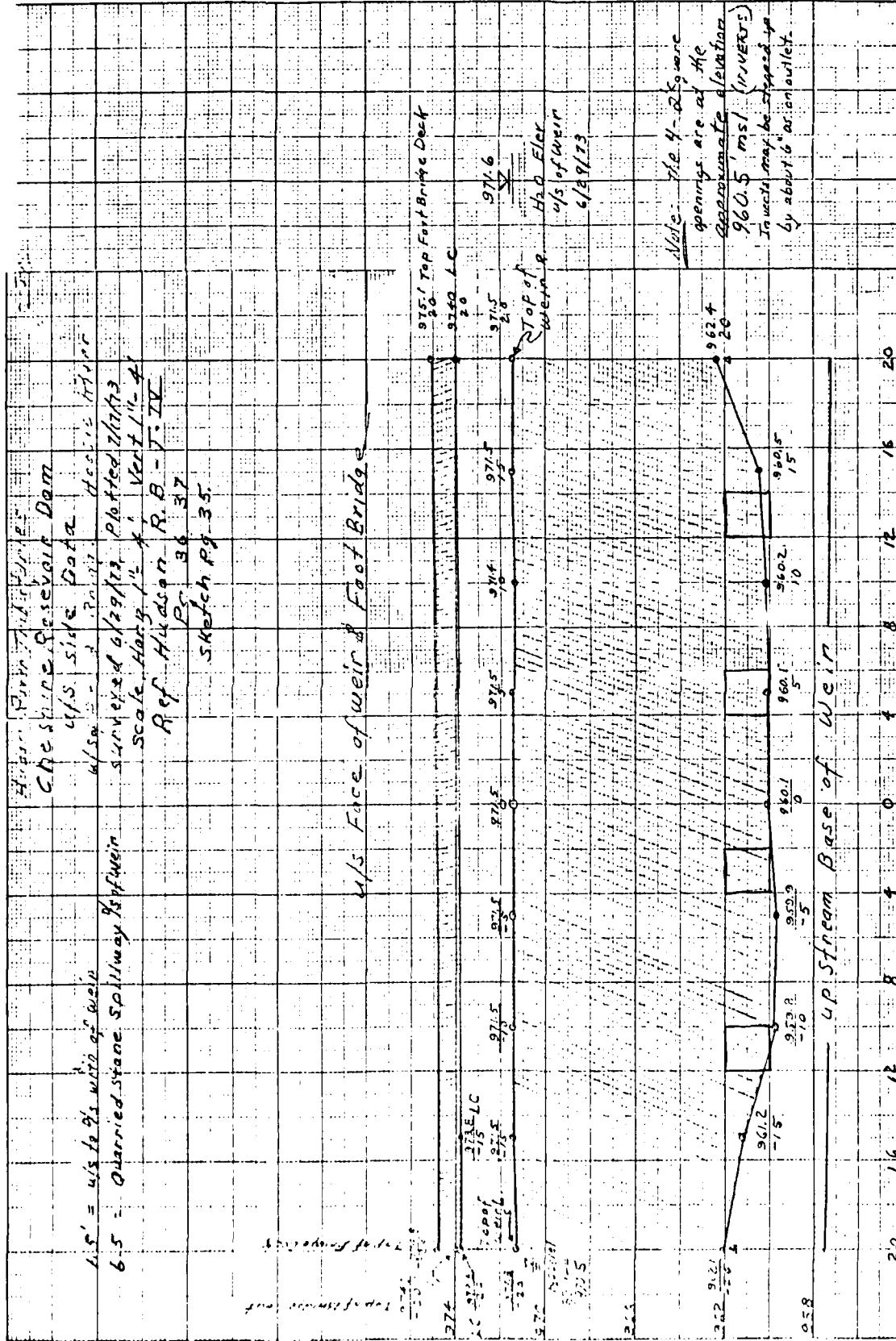
In addition I found a 2' Accmp on the far left bank of storage area II. Its invert elev is approx 971.0 however this culvert does not drain storage area I (It was running today 3/4/79) I could not locate its source but it appears as if it may drain the road running above the left bank at this point.

5) Nobody's Rd. -

This is now called Pinyallie Rd. Crossing

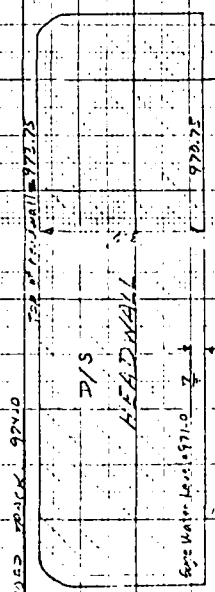




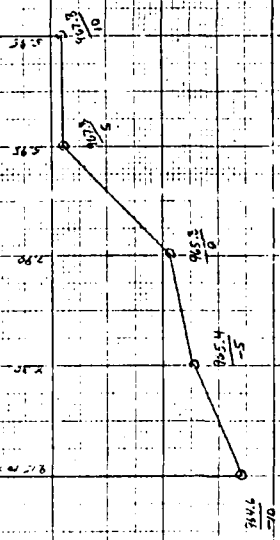


Hudson River Tributaries South Branch Hoosic River at Chesire Res. Railroad Culvert

From measurements taken as follows by L.L. & J.A. (also as photo)
Plotted 2/22/74 - L.L.



Note: The upstream side is practically identical in area but has reduced capacity due to pipe mesh racks. The effective flow area is about 2/3 of the gross opening area.
Assumed 4.5 ft x 15.0 ft box culvert for tele-type rating



WATER
& RELATED LAND
RESOURCES

OF



THE
BERKSHIRE REGION

MASSACHUSETTS

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
ECONOMIC RESEARCH SERVICE
FOREST SERVICE

IN COOPERATION WITH
MASSACHUSETTS WATER RESOURCES COMMISSION

197

MASSACHUSETTS

6-100 NC 3-747530-1 303 10 30

Information estimated for planning purposes only, should not be used for final design or construction.

General construction type.

Floods that occur under present watershed and flood plain conditions, see Text.

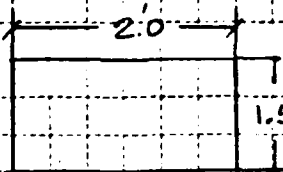
was in the upper reaches of the stream at the time.

TAMS

b No. 1497-18
 Object INSPECTION Cherchire Reservoir
 Subject Spillway sluiceways.

Sheet of
 Date Nov. 7, 1977
 By RH
 Ch'k. by

W.S. El. 971.5 and 974.2, Low W.S. El. 964.2



$$\text{Area} = 2 \times 1.5 = 3 \text{ D'}$$

Use eq for square box making $D = \sqrt{3} = 1.732$

$$H_T = \left[\frac{1.555(1+K_e)}{D^4} + \frac{287.64 n^2 L}{D^{16/3}} \right] \left(\frac{Q}{10} \right)^2$$

$$n = 0.013$$

$$H_{T_u} = 974.2 - 964.2 = 10 \text{ ft.}$$

$$D = 1.732$$

$$H_{T_L} = 971.5 - 964.2 = 7.3$$

$$L = 9'$$

$$K_e = 1.0$$

Q at W.S. El. 974.2

$$H_T = 10'$$

$$10 = \left[\frac{1.555(2)}{1.732^4} + \frac{287.64(0.013^2)9}{1.732^{16/3}} \right] \left(\frac{Q}{10} \right)^2$$

$$10 = 0.369 \left(\frac{Q}{10} \right)^2$$

$$Q = \sqrt{\frac{10}{0.369}} (10) = 52.1 \text{ cfs per culvert}$$

$$Q_T = 52.1 \times 4 = 208.2 \text{ cfs}$$

IAVIS

Job No. 1497-18

Project INSPECTION CHESHIRE LAKE

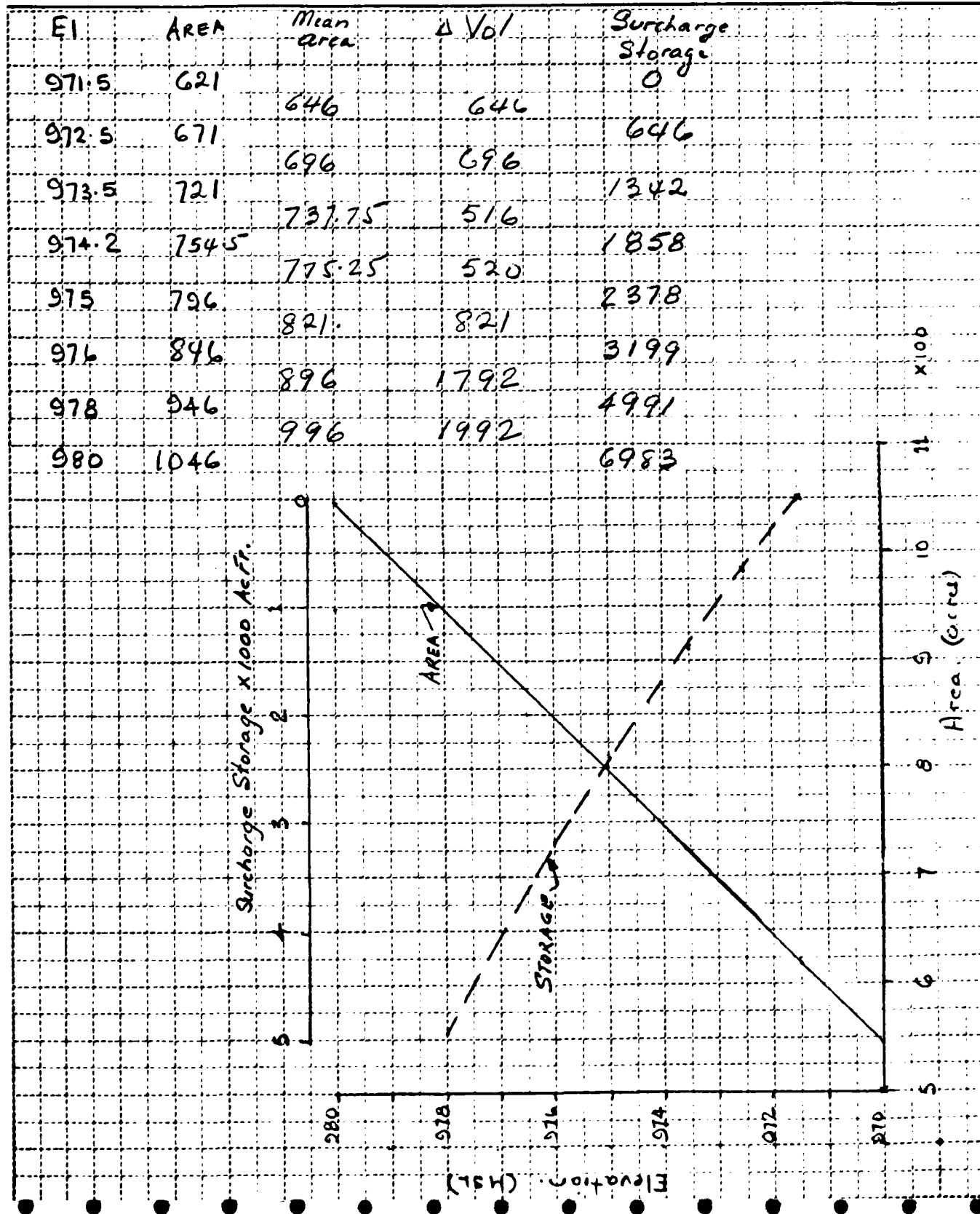
Subject _____

Sheet _____ of _____

Date Nov 10, 1978

By D.L.C.

Ch'k. by _____



TAMS

Job No. 1497-18

Project INSPECTION CHESHIRE RESERVOIR.

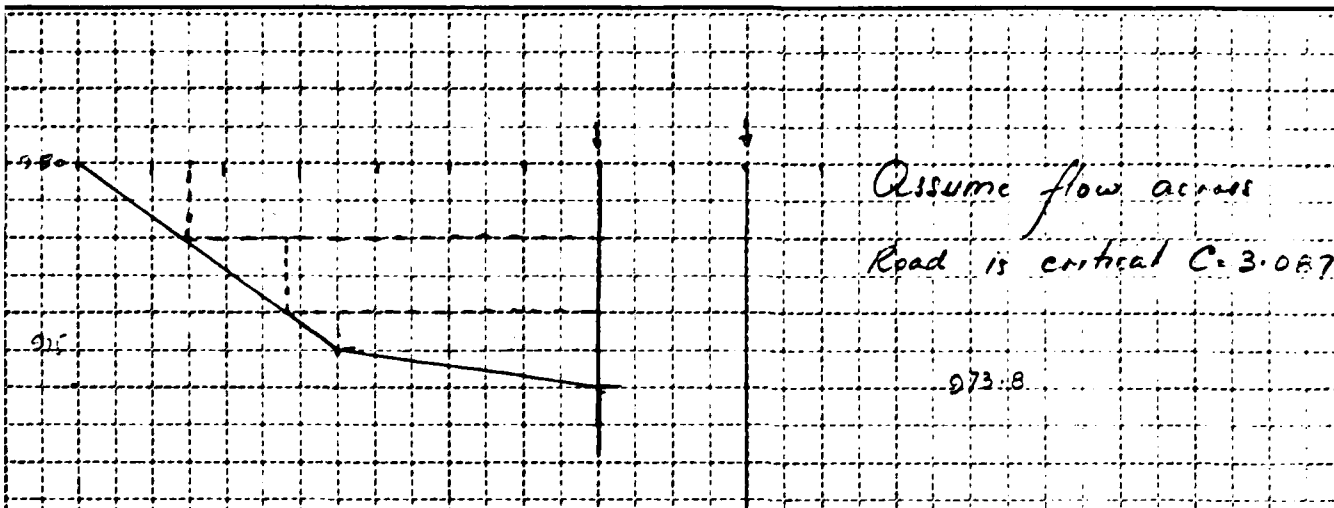
Subject Flow over road below Lower Pond.

Sheet of

Date OCT 31, 1978

By D.L.C.

Ch'k. by



Flow over roadway

El	Δ Area	Total Area	L	Equiv H	C	$Q = 3.087 L H^{3/2}$	Q_L
974	0					0	178
975	350	350	700	.5		764	
976	770	1120	850	1.32		3979	
978	1900	3060	1130	2.71		15,562	
980	2500	5560	1400	3.97		34,186	

IAMS

Job No. 1497-18

Project INSPECTION CHESHIRE RESERVOIR.

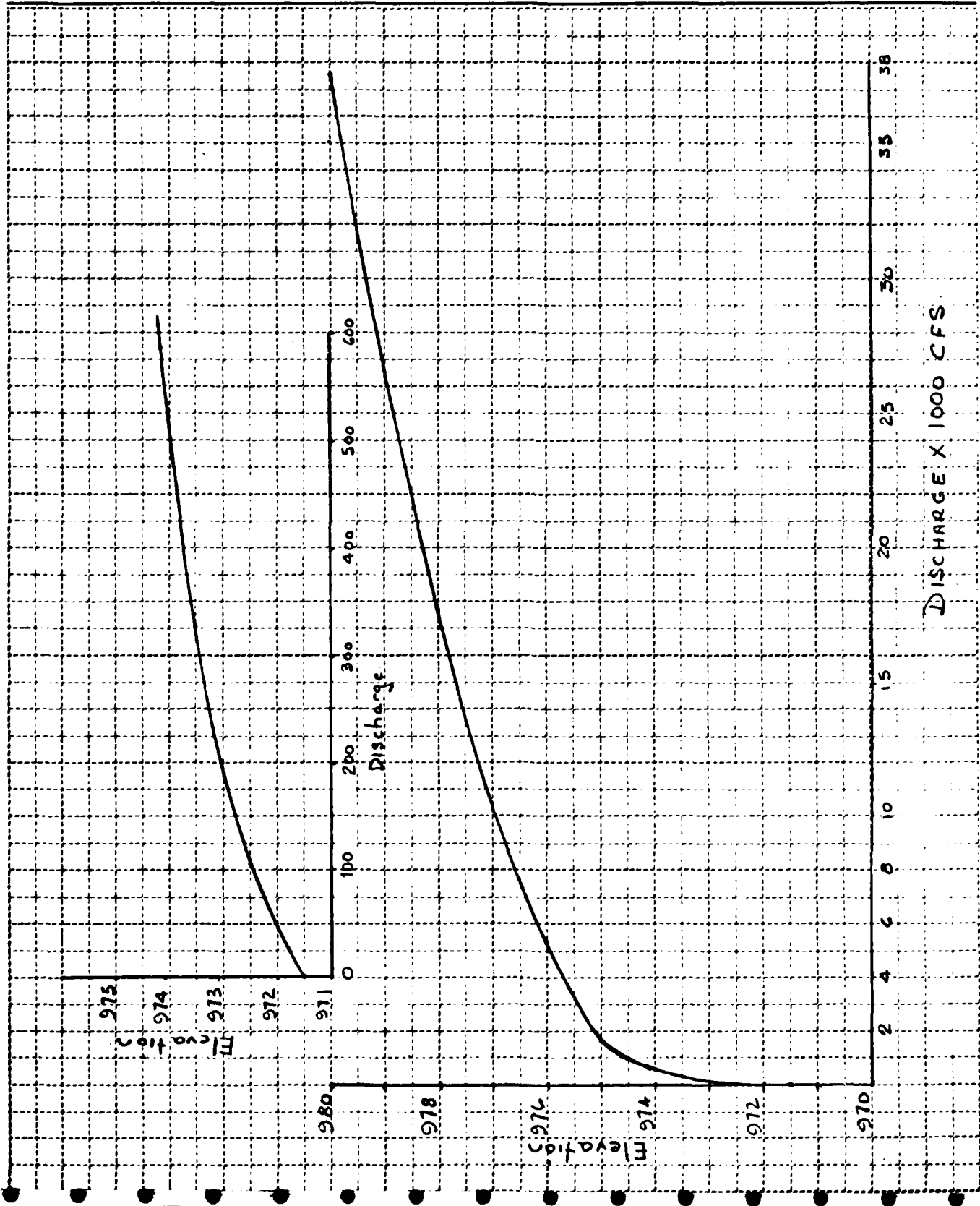
Subject OUTFLOW DISCHARGE RATING CURVE.

Sheet of

Date OCT 31, 1978

By D.L.C

Ch'k. by



TAMS

Job No. 1497-18
 Project INSPECTION CHESHIRE RESERVOIR
 Subject Head / Outflow discharge relation.
Lower Reservoir.

Sheet of
 Date OCT 31 1978
 By
 Ch'k. by

Spillway length 40.5'
 Crest width 2.0' Crest EI 970 MSL*
 Training wall ht 2.67 EI 972.67 MSL

* EI taken from USGS Quadrangle Map (7 1/2 min. Series)

Assume spillway acts as broad-crested weir.
 Assume flow over dam is critical $C = 3.087$

*EI	Head	C	$Q = CLH^{3/2}$ (weir)	H Dam	Q_{Dam}	TOTAL Q	EI
971.5	0	0				0	971.5
97	1.0	2.66	108			108	972.5
97	2.0	2.85	326			326	973.5
97	2.67	3.30	583	0		583	974.17
97:	3.5	3.32	880	.33	764	1644	975
97	4.5	3.32	1284	1.33	3979	5263	976
97	6.5	3.32	2228	3.33	15,562	17,790	978
	8.5	3.32	3332	5.33	34186	37,518	980

Weir acts as sharp crested weir at and above 3.0' head

TAMS

Job No. 1497-18

Project INSPECTION CHESHIRE RESERVOIR

Subject _____

Sheet _____ of _____

Date OCT 26, 78

By D.L.C

Ch'k. by _____

TOTAL $H \times A = 12,934.84$ $L \times A = 26.077$ $A = 12.4$

weighted H 1043.1 weighted L 2.10 miles / 11,104 ft.

Mean slope = $(1043.1 / 11,104) 100 = 9.4\%$

Assume for 9% basin slope, & an average velocity of 5 fps.

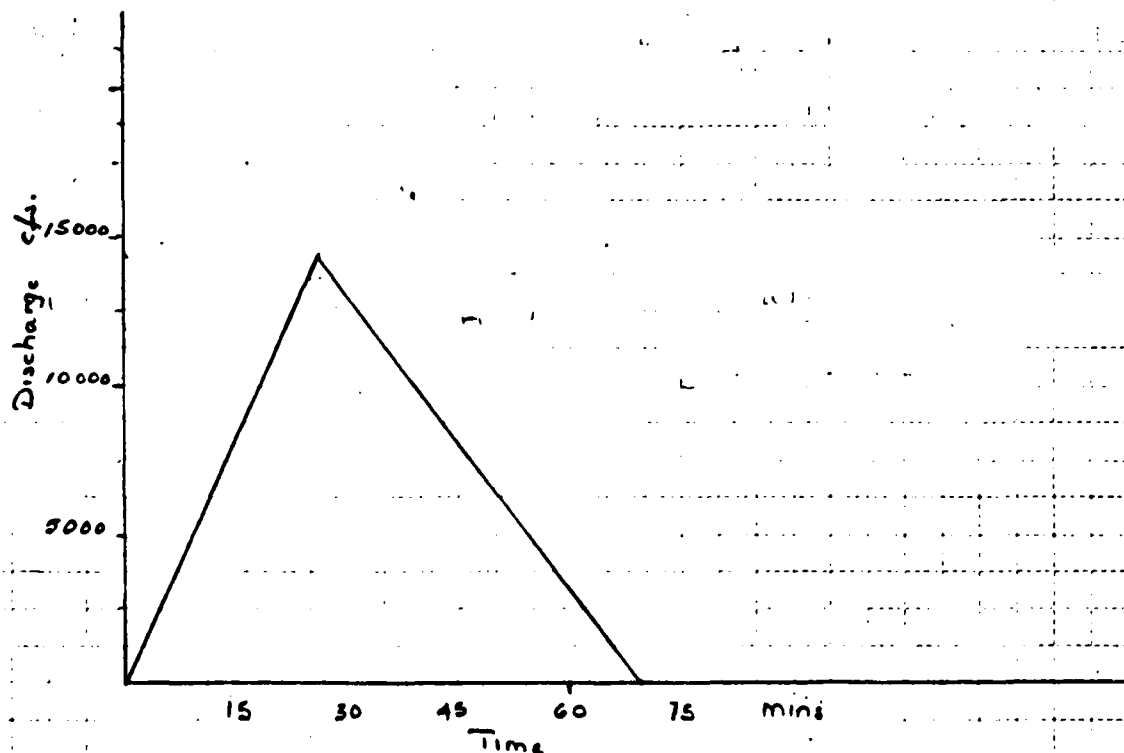
then estimated $T_c = 11,104 / 5 = 37$ mins or 0.62 hours

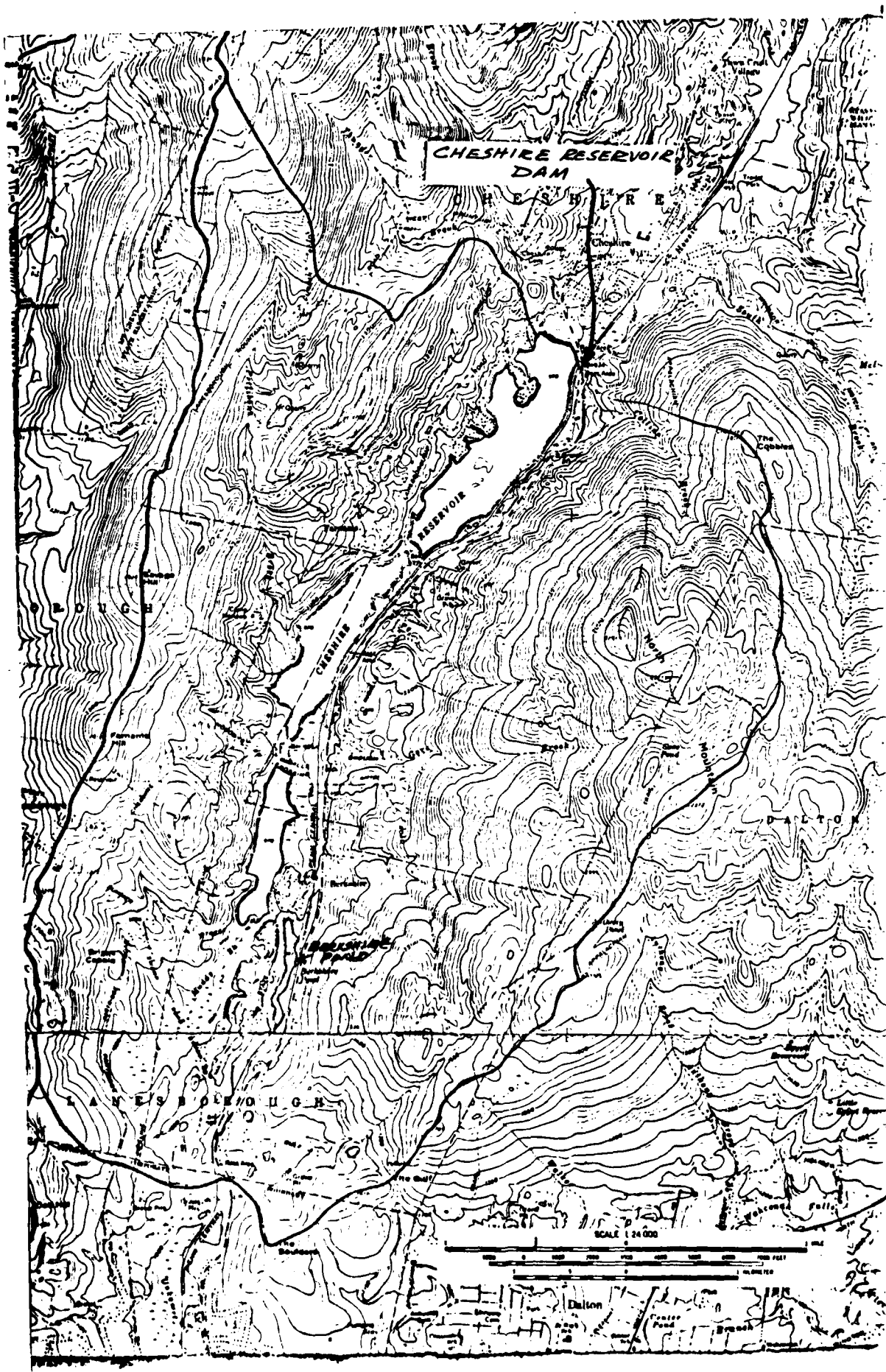
$D = \frac{1}{2} T_c = 0.12$ hrs / 7.4 mins say 7.5 mins

$T_p = 0.625 + 0.372 = 0.43$ hrs / 26 mins

$Q_p = \frac{484 \times 12.4}{43} = 13,957$ cfs.

$T_b = 2.67 T_p = 1.15$ hrs / 68.9 mins.





HYDROLOGIC DATA AND COMPUTATIONS

APPENDIX D



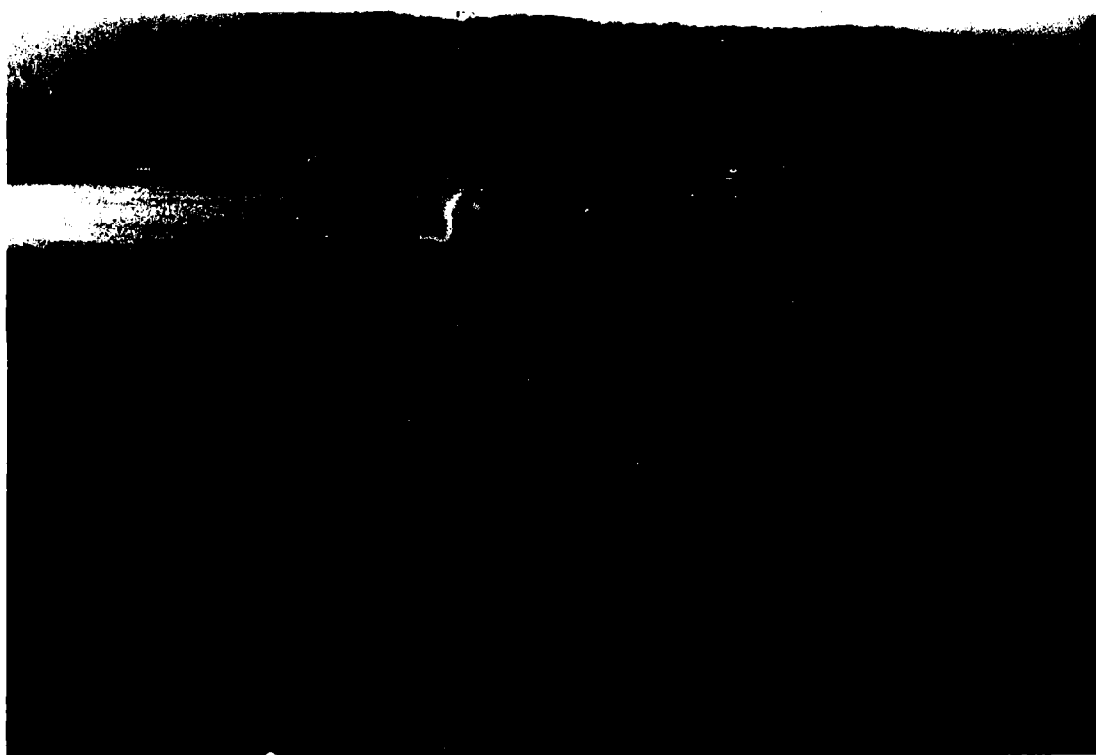
7. VIEW OF DOWNSTREAM CHANNEL LOOKING UPSTREAM.
NOTE MASS. RTE. NO. 8 BRIDGE AND REMNANT OF OLD
BRIDGE SUPPORT IN BACKGROUND.



8. VIEW OF DOWNSTREAM CHANNEL LOOKING DOWNSTREAM.



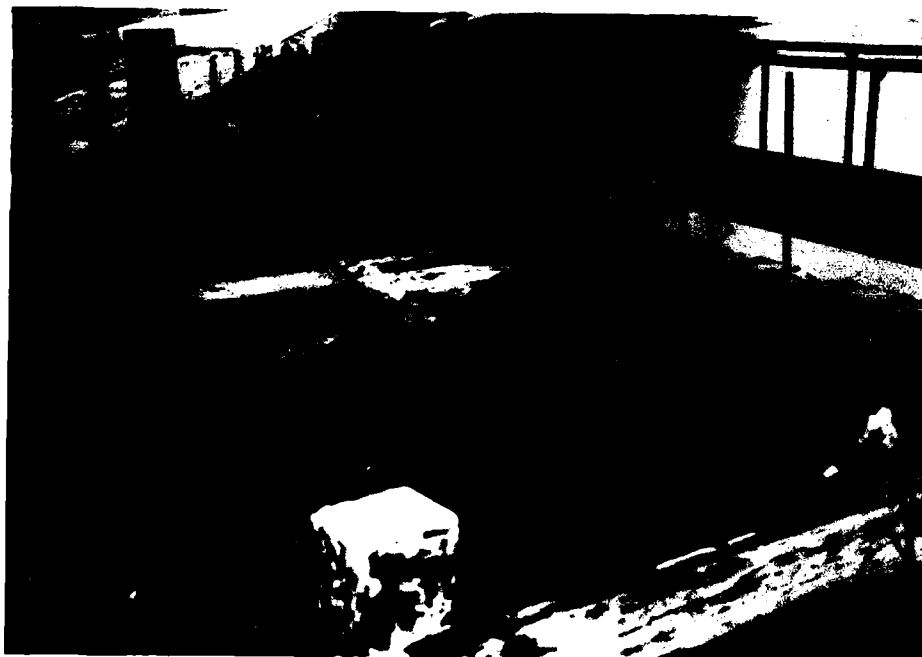
5. VIEW OF ACCESS WALKWAY TO LOW LEVEL GATE VALVE STEMS.



6. VIEW OF RAILROAD EMBANKMENT AND BRIDGE CROSSING CONNECTING LAKE TO APPROACH CHANNEL.



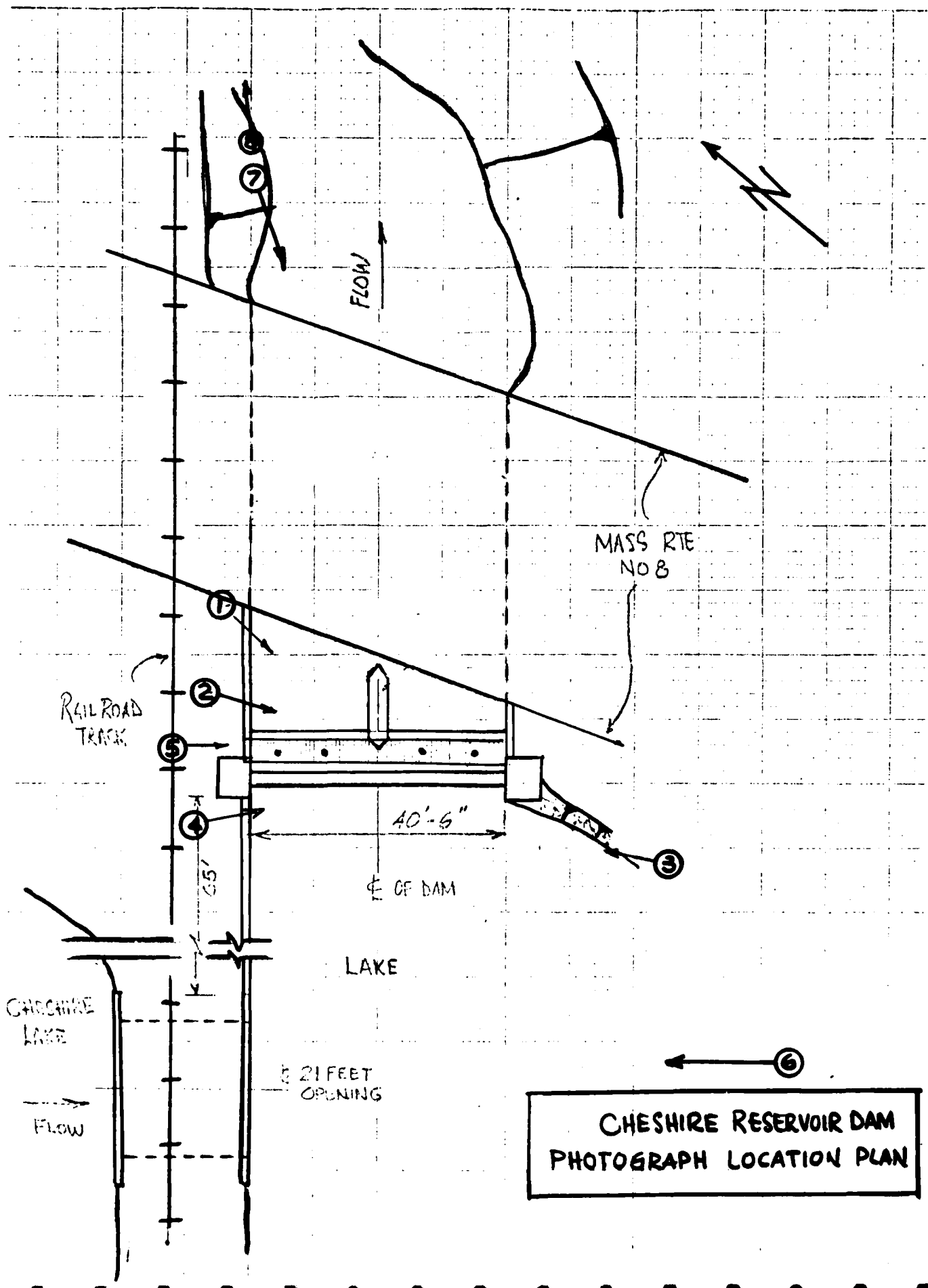
3. VIEW OF UPSTREAM APPROACH CHANNEL. NOTE
STONE MASONRY WALL AND CONCRETE LINED SLOPE.



4. VIEW OF SPILLWAY CREST AND REMNANT OF BRIDGE PIER.



2. VIEW OF CREST AND DOWNSTREAM FACE.
NOTE PRESSURE LEAKS.



CHESHIRE RESERVOIR DAM
PHOTOGRAPH LOCATION PLAN

PHOTOGRAPHS

APPENDIX C

TAMS

Job No. 1427-1B

Sheet _____ of _____

Project _____

Inspection Cheshire Reservoir

Date Nov 7 1978

Subject _____

Sluiceway discharge computation

By RH

Ch'k. by _____

Q at WS El. 971.5

$$H_T = 7.3$$

$$7.3 = \left[\frac{1.555(2)}{1.7324} + \frac{287.64(0.013)^2 9}{1.732^{16/3}} \right] \left(\frac{Q}{10} \right)^2$$

$$7.3 = 0.369 \left(\frac{Q}{10} \right)^2$$

$$Q = \sqrt{\frac{7.3}{0.369}} (10) = 44.5 \text{ cfs}$$

$$Q_T = 44.5 \text{ cfs} \times 4 = 178 \text{ cfs}$$

CHESHIRE RESERVOIR JOR NO 1497 1R
MOOSIC RIVER BASIN-BERKSHIRE COUNTY
SAFETY INSPECTION-TAMS NOV 78

MALE PMF

INPUT PARAMETERS

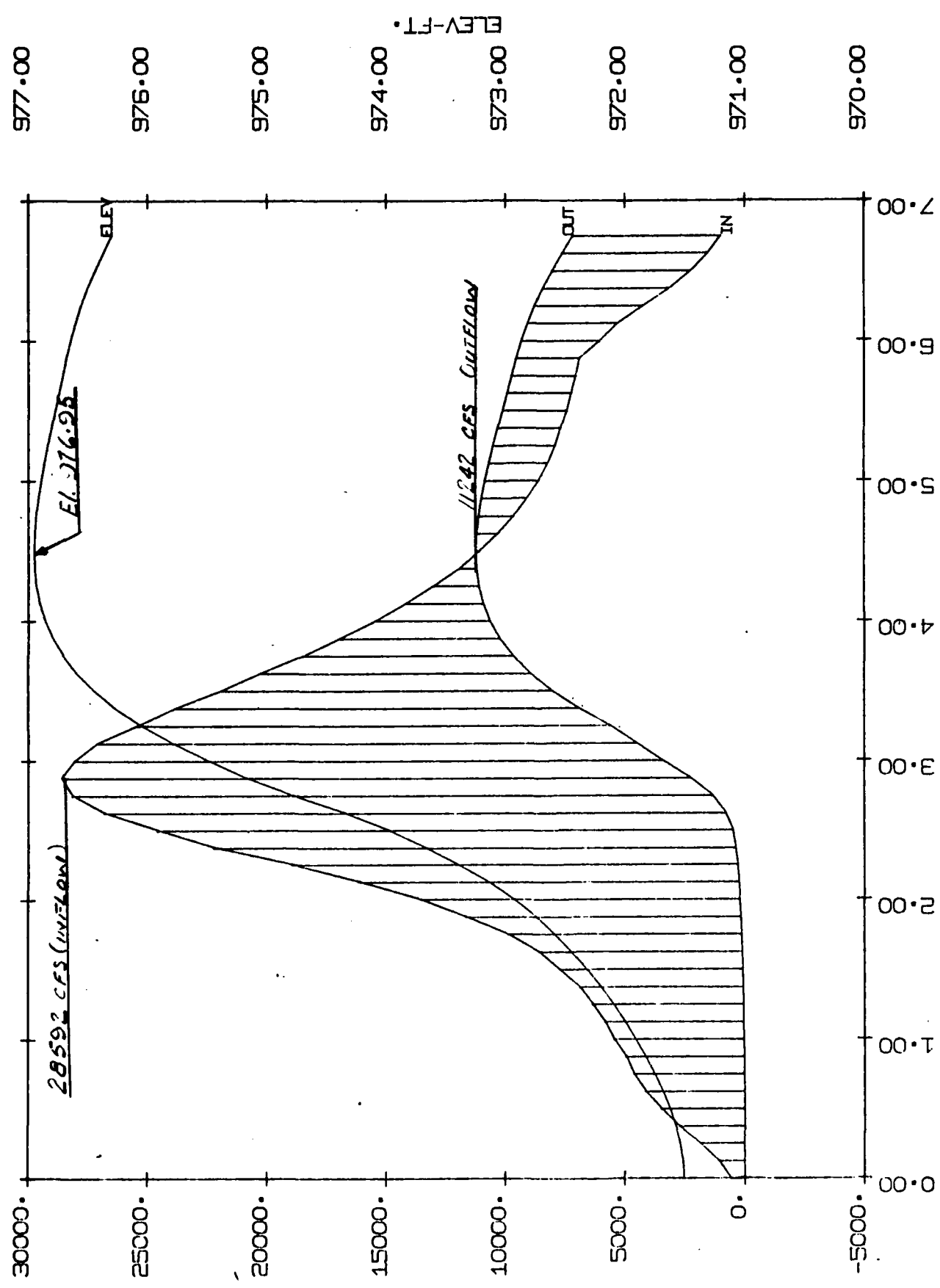
STARTING ELEV. (FT.)	TIME INTERVAL (HOURS)	STARTING TIME (HOURS)	ENDING TIME (HOURS)	PRINT INTERVAL (HOURS)	GATE OPTION	PLOT OPTION	STORAGE COEF.	OUTFLOW COEF.	INFLOW COEF.	TIME COEF.	BREAK TIME
971.50	0.12	0.00	6.87	1	NO	YES	1.000	1.000	0.500	1.000	0.000

RESERVOIR ELEV. (FT.)	RESERVOIR STORAGE (ACFT)	RESERVOIR OUTFLOW (CFS)
971.50	0.0000	0.00
972.50	646.0001	109.00
973.50	1342.0002	326.00
974.17	1959.0002	583.00
975.00	2379.0004	1644.00
976.00	3199.0004	5263.00
978.00	4991.0009	17790.00
980.00	6983.0009	37518.00

TIME (HRS)	INFLOW (CFS)	OUTFLOW (CFS)	STORAGE (ACFT)	ELEVATION (FEET)
0.00	0.00		0.0000	971.50
0.13	559.10	0.48	2.9854	971.50
0.25	1055.10	1.87	11.2110	971.51
0.35	1830.00	4.36	26.0812	971.54
0.50	2724.10	8.28	49.5391	971.57
0.63	3479.45	13.62	81.4691	971.62
0.75	4125.00	20.15	120.5737	971.68
0.88	4622.15	27.67	165.5082	971.75
1.00	4952.50	35.88	214.6357	971.83
1.13	5452.70	44.79	267.9648	971.91
1.25	5835.15	54.46	325.7725	972.00
1.38	6351.75	64.88	388.1203	972.10
1.50	6887.30	76.19	455.7753	972.20
1.63	7710.50	88.66	530.3253	972.32
1.75	8592.55	102.57	613.5473	972.44
1.88	9470.00	127.33	707.7403	972.58
2.00	11640.90	161.67	817.3573	972.74
2.13	13549.75	201.83	945.5964	972.93
2.25	16097.85	249.07	1096.4055	973.14
2.38	18942.65	304.86	1274.5380	973.40
2.50	22236.10	396.55	1483.6574	973.68
2.63	24580.90	514.65	1720.7734	973.99
2.75	26799.70	631.64	1979.8598	974.36
2.88	28138.75	1387.24	2252.1616	974.79
3.00	28592.45	2301.37	2527.1313	975.18
3.13	28031.05	3459.25	2789.8071	975.50
3.25	27068.20	4531.67	3033.0927	975.79
3.38	25398.95	5633.63	3252.0205	976.05
3.50	23905.95	6955.19	3441.0703	976.27
3.63	21888.40	8062.38	3599.4555	976.44
3.75	20233.75	8968.00	3729.0053	976.59
3.88	18443.20	9690.51	3832.3613	976.70
4.00	16912.55	10246.99	3911.9663	976.79
4.13	15413.00	10659.14	3970.9243	976.86
4.25	14153.30	10946.46	4012.0258	976.90
4.38	12990.15	11129.36	4038.1899	976.93
4.50	11922.50	11221.81	4051.4145	976.95
4.63	11102.35	11242.05	4054.3105	976.95
4.75	10328.10	11205.34	4049.0595	976.94
4.88	9653.90	11120.74	4036.9565	976.93
5.00	9092.00	10998.97	4019.5371	976.91
5.13	8602.70	10849.06	3998.0927	976.89
5.25	8212.35	10678.96	3973.7592	976.86
5.38	7901.25	10496.27	3947.6254	976.83
5.50	7666.05	10307.28	3920.5903	976.80
5.63	7424.45	10114.84	3893.0625	976.77
5.75	7236.45	9920.86	3865.3120	976.74
5.88	7051.80	9727.40	3837.6377	976.71
6.00	6878.35	9534.94	3810.1069	976.68

TIME (HRS)	INFLOW (CFS)	OUTFLOW (CFS)	STORAGE (ACFT)	ELEVATION (FT.)
6.13	6033.20	9320.41	3779.4184	976.64
6.25	5289.00	9065.47	3742.9482	976.60
6.38	4250.70	8766.19	3700.1362	976.55
6.50	3139.55	8412.89	3649.5957	976.50
6.63	2245.10	8014.33	3592.5820	976.43
6.75	1539.60	7587.61	3531.5678	976.37
6.88	999.50	7147.62	3468.5976	976.30
MAX. VALUES	28592.45	11242.05		976.95
MIN. VALUES	0.00	0.00		971.50

000 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400 2500 2600 2700 2800 2900 3000 3100 3200 3300 3400 3500 3600 3700 3800 3900 4000 4100 4200 4300 4400 4500 4600 4700 4800 4900 5000 5100 5200 5300 5400 5500 5600 5700 5800 5900 6000 6100 6200 6300 6400 6500 6600 6700 6800 6900 7000 7100 7200 7300 7400 7500 7600 7700 7800 7900 8000 8100 8200 8300 8400 8500 8600 8700 8800 8900 9000 9100 9200 9300 9400 9500 9600 9700 9800 9900 10000



CHESHIRE RESERVOIR
50% PMF

TIME-HRS

INFORMATION AS CONTAINED IN THE
NATIONAL INVENTORY OF DAMS

APPENDIX E

10

[illegible]

END

FILMED

7-85

DTIC